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Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

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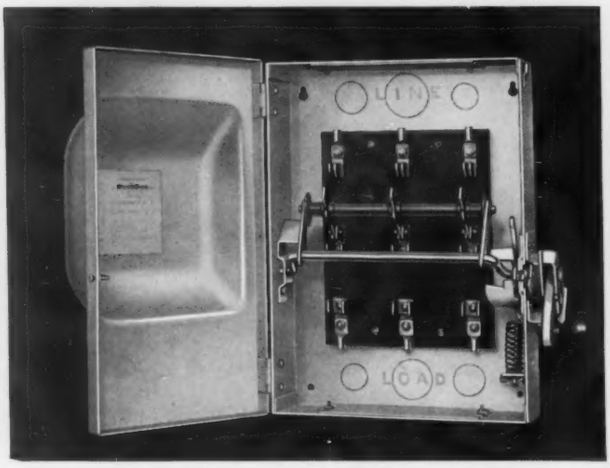

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A New Era in Merchandising

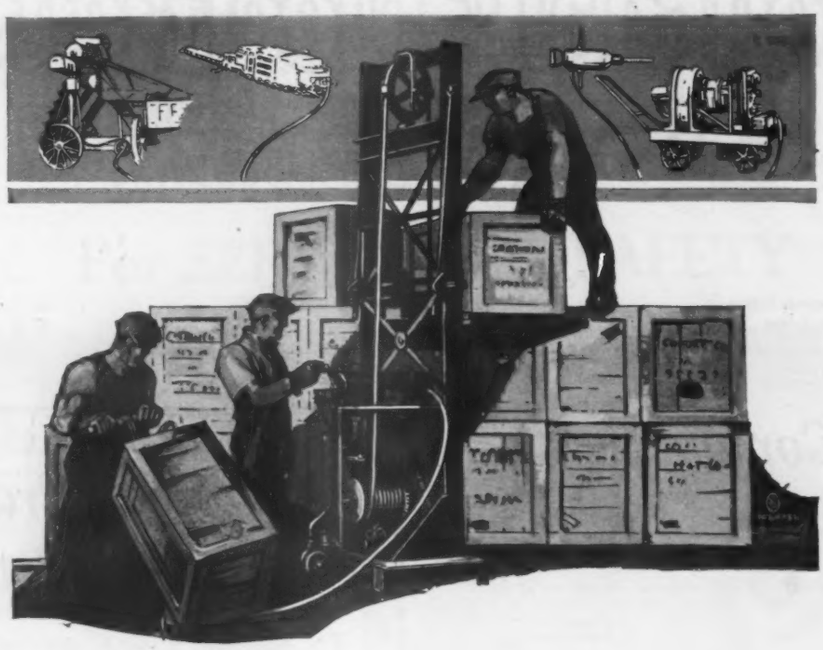
IN line with a policy devoted to the betterment of the industry in all of its many phases, a new and stronger policy with regard to the activity of the Better Merchandising section of the Journal of Electricity is announced in this issue.

Feeling that the year 1926 can be made an epoch of commercial development in the electrical industry by the application of those principles which have given other American industries such a leading position in the commercial world, the Better Merchandising section will be edited with a view to pointing the way to that development.

There can be no doubt about the value of higher-powered merchandising, more efficient and more able selling. To the central station company it means load-building. To the contractor it means a demand for more wiring to care for the increased uses to which electricity may be put. And to the merchandiser, with the manufacturer, the jobber and the supply sources backing him up, the program means better and more business along sounder lines.

Many central-station companies themselves are about to launch intensive merchandising activities. Many non-electrical outlets are going to push electrical merchandise as never before. But for whoever applies scientific and sensible sales methods the rewards will be ample.

And it shall be the purpose of the Better Merchandising section of this magazine to concentrate and digest these selling principles so that all who read may learn, and, learning, apply them with profit to their own merchandising activities.



Go After This Business

Industrial plants are heavy buyers of electrical supplies. They yield a steady income to the electrical dealer who can hold their business. One sure way to keep your industrial customers satisfied is for you to recommend and install only equipment that has shown its ability to stand up under the hardest conditions of service.

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EDITORIAL

New Radio Developments as They Affect the Power Company

INVESTIGATING complaints and correcting faults where they are directly traceable to the condition of power lines is an important and essential duty of the central station in connection with the development of radio. But aside from this, what should be the attitude of the power companies toward the radio industry? Developments of the past few months have brought this question forcibly to the attention of central-station executives. With the perfection of a.c. current supply, radio sets have been placed in the class of socket appliances and as such represent an important source of revenue. Radio engineers state that an ordinary battery charger represents a connected load of 100 watts, while the more recently developed amplifiers have capacities as high as 250 watts. On the basis of only average use by the radio operator it is conceivable that a battery charger will use upwards of 50 kw-hr. per year and a power amplifier 400 kw-hr.

As a matter of fact, a study of battery-chargers connected to the lines of one Pacific Coast power company revealed the fact that the additional revenue derived from radio during 1925 was approximately $200,000 and that the estimated revenue for 1926 will approximate $400,000. This also takes into consideration the revenue from kilowatt-hours used for lighting during the additional hours that a radio set is in operation in the evening.

In the face of these facts it would seem that power companies must give some consideration to the subject of radio and their attitude toward it. Whether or not central-station commercial departments will be justified in merchandising complete radio sets, battery chargers or the newly perfected A and B battery eliminators will be a problem for each company to decide for itself. Central stations which have undertaken the merchandising of radio have met with varying degrees of success.

It has been suggested that power companies might own and operate broadcasting stations, but this step is not to be recommended because the radio industry is looking for the support of broadcasting to outside sources—among others, to those who derive no direct benefit from the sale of radio apparatus but who appreciate the advertising value of broadcasting.

However, the radio industry is justified in looking to the power companies for some measure of co-operation in return for the benefits which are being derived from the development of radio. Just what direction this co-operation is to take is a matter for conjecture. It might well take the form of co-operation with the local radio trade association. The radio trade would welcome such a step. Also more money might be spent on "trouble shooting" crews to investigate radio complaints. The latter suggestion has many virtues.

Whatever the attitude of any individual power company on the subject, the fact remains that so long as the present trend in radio keeps up, the radio operator must look to the central station for energy to operate his set, either through a battery-charger or a direct a.c. current supply.

Installment Selling Is Boon to Electrical Industry

MANY people and organizations, even our own United States Chamber of Commerce, are giving serious thought to the phenomenal expansion of installment selling. Ten years ago the so-called deferred-payment plan was confined chiefly to real estate, furniture, pianos and expensive sets of books. Today almost nothing escapes. It has been estimated that the aggregate amount of installment credit now in force in the United States is in the neighborhood of $3,000,000,000. While this figure is admittedly a guess it is probably a close approximation of the actual truth.

Economists, investigators and other learned folk are arguing vociferously both for and against this method of selling. A prominent New York banker recently has come out unequivocally as opposed to installment selling, while manufacturers, merchants and other bankers are equally vigorous in their statements that deferred payments and installment selling are the life of modern business. Many banks, especially in the West, are "selling $1,000" on installments as an interesting means of using a deferred-payment plan of inducing thrift, while those opposed to the idea make the claim that installment purchasing induces extravagance.

It is difficult for the dispassionate observer to take sides in a question such as this when so-called experts seem to disagree so radically. Installment purchases are used vigorously by every commercial branch of the electrical industry in furthering the sale of electrical appliances particularly, and they are doing it with undoubted success both for the buyer and the seller. It would appear to be fairly obvious that the installment or deferred-payment plan as marking a new era in merchandising is a tool of undoubted excellence and efficiency when it is administered wisely and applied to constructive purchasing. Like any other tool it can be misapplied and become destructive when it is used to induce extravagance and promote the purchase of articles clearly in the luxury class. It is not that

installment or deferred-payment merchandising is unsound. It may prove to be unsound when it urges the purchase of luxuries and other extravagances beyond the means and unjustified by the income of the installment purchaser. To be able to purchase such things as electric household appliances by the installment plan confers a real blessing upon the householder because of the labor-saving, convenience and economy of the articles purchased. As applied to the purchase of an expensive diamond ring, for instance, the opposite would appear to be the case. There are many people, unfortunately, who are so constituted that, in the vernacular of the street, they cannot save a cent, but put them in debt in a constructive way and they will work themselves out, provided that it is not overdone.

On the whole we believe that installment-plan purchases have done an infinitely greater amount of good than harm.

Taking Tips from the Automobile Salesman

"FOR instance," said a noted executive at a recent street railway men's convention, "street cars had eight-wheel brakes for years, and nobody even thought anything about it. But when automobiles began to be equipped with four-wheel brakes, it was the leading topic of conversation everywhere." He went on to show that street railways might learn much from the automobile industry in the way of selling their service to the public.

The street railway is not the only one who may learn from the automobile industry something in the way of sales promotion. There is much that the electrical merchandiser may learn from this same cource. The subject of sales is one that the electrical dealer has only just begun to realize as of prime importance. The pioneer job of wiring all the homes of the community seemed more important than selling appliances to be used on those outlets installed, at least until recently. As a result, perhaps salesmanship has not been developed in the electrical industry to the high pitch which necessity demanded in the automobile industry.

Many of these things were discussed in a recent commercial meeting, and many ideas, used for some time by automobile dealers, have been proposed for modification and use by electrical merchandisers.

One proposal made was that electrical interests work out a standard scale of repair job prices. The motorist with a valve-grinding job or loose connecting-rod bearings knows by reference to a standard price chart just about what the repair job will cost him. Why can not the washing-machine owner refer to a price scale to see what it will cost her for a complete re-oiling and adjusting, or for the replacement of worn wringer rollers. The idea is worth thought.

Another plan suggested was a maintenance-insurance policy idea for major appliances. It would work as follows: After the guarantee period for gratis repair and replacement, a definite yearly service charge of, say $5, would entitle the appliance owner to regular inspection of the apparatus and free repair and replacement in case of breakdown. Many appliance owners would welcome such a policy for mere relief from worry and for the privilege of having a competent mechanic oil up the machinery when it was needed and see that everything was in perfect adjustment.

A courteous gesture that will reflect in good will and can be made a definite sales-builder for return orders from the same customers is a plan that has been suggested for incorporation in the appliance committee's yearly program. It, too, is an adaptation of an automobile sales policy. A postcard is sent to the purchaser of any electrical appliance just thirty days or so before the expiration of the guarantee on the appliance. Its purpose is ostensibly to remind the purchaser that a year ago the appliance was purchased and that the guarantee period is about to expire. If the appliance has been found defective in any way, the customer is urged to bring it in for repair before the expiration date. The appliance, if it has reposed on a shelf for some time, immediately is trotted out and used at peak load to force it to bring forth any possible defect before the guarantee runs out. The customer gets into the habit of using it. The appliance is put on the line where it is meant to be. And the dealer who sold it earns a feeling from the customer that here is a merchant who is interested in seeing that his products give service. The postcard acts as a silent salesman for other appliances from the store.

No doubt there are many more sales stunts which may be borrowed from the automobile man. There are many which can be taken from other lines of sales activity. And since, basically, all sales are built upon the same cardinal principles of service, they are the property of all who may wish to use them.

1926 Will Be Banner Electric Refrigeration Year

THE year 1925 will stand out in the commercial annals of the electric light and power industry as a banner year because it marked the definite arousing of interest in the commercial possibilities of domestic electric refrigeration. Today the industry stands upon the portal of a year of golden promise in the development of this load.

Those central stations which have not yet studied and profited by the work done in connection with domestic refrigeration during 1925 are overlooking a fruitful field. Such commercial departments as have not included the electric refrigerator among the appliances which will be merchandised during 1926 are shortsighted. To their managers we recommend the immediate consideration of the report of the electric refrigeration committee of the N.E.L.A. If they do not then become enthused there is no hope for them.

To the central stations who are planning actively to merchandise electric refrigerators we also recommend the same report and more especially the methods suggested. These are:

1. High-grade salesmen specializing on refrigeration alone.

2. Carefully selected prospect lists covered by

salesmen at regular intervals and followed up by mail advertising.

3. Newspaper advertising emphasizing the importance of proper refrigeration and special advantages of electric refrigeration.

4. Displays in electric shops, home exhibitions, etc.

5. Specially trained service men on call at all times.

6. Regular system of inspection until public becomes educated to the care of refrigerators.

The extent to which central stations will profit from this field during the year will be directly proportional to the amount of effort expended. Nineteen twenty-six will be a banner refrigerator year.

Red Seal Promises Achievement of Electrical Home Idea

PREPARATIONS under way for placing the Red Seal plan in operation in California have reached the point where it is believed that the elaborately built organization will be functioning almost entirely by the end of this month. It has taken a great deal of thought and study, particularly in working out the details, to organize so large a state as California and provide a modus operandi that would be as free from red tape as possible and yet one that would be effective and comply in every respect with the fundamental laws of the Red Seal plan as promulgated by the Society for Electrical Development.

In studying the principles involved it should be pointed out that, while on the surface the Red Seal plan is a method of promoting adequate house-wiring, this alone is not the ultimate goal to be achieved. It is a first step and only a first step in the achievement of the ultimate ambition of every real, true-blue member of the electrical fraternity, and that is the complete electrical home.

In the final analysis the success of the Red Seal plan will depend upon the manufacturers, the jobbers and the retailers. The details of the administration of the plan in California provide that lists of Red Seal home-builders and owners shall be disseminated among subscribers to the Bureau funds. Herein lies the real opportunity for those engaged in the manufacture and sale of electrical appliances, particularly the larger current-consuming devices. The degree to which this branch of the industry follows up the opportunity afforded by so splendid a list of prospects will measure finally the ultimate success of the Red Seal plan. The 100-per-cent electrical home should be the goal of every member of the industry. The Red Seal plan offers an ideal opportunity for the accomplishment of this end.

Henry Ford Speaks on Municipal Ownership

HENRY FORD, provider of recreation, transportation and grief to the multitude, whether it be for picnicking on the shore of Puget Sound, crossing America or hunting lions in Africa with a bow and arrow, has some definite ideas on why municipal plants fail. In a recent copy of his Dearborn Independent he says:

"I read in the papers that the municipal ownership cry is subsiding in the U.S. The probable reason is that, good as it is in theory, it does not work in practice.

"Men who are competent to run great enterprises are not in politics and if they are hired to run municipal utilities they are too much hindered by politics.

"One very bad feature of municipal ownership is that the newspapers seldom tell the people the full truth about it. One good feature of private operation is that newspapers jump on a corporation at the least deviation from service.

"But, whether privately or publicly operated, public utilities should be strictly amenable to general public control. Every franchise should stipulate that. And in municipal ownership taxpayers should be informed how much of a deficit they are making up."

As Mr. Ford says, all public utilities should be subject to public control. But when government enters business there ceases to be any independent critic which can supervise and control its operations. In the case of municipal utilities railroad or utility commission supervision might be recommended to everyone but the municipal ownership adherents themselves. They know what a poor showing they would make in comparison with the privately operated utilities.

DISCUSSION

Corrects Impression That Power Company Is Co-licensee with Irrigation District

To the Editor:

Sir—In the Dec. 15 issue of the Journal there appeared an item to the effect that Pacific Gas and Electric Company is made co-licensee with Nevada Irrigation District in a license recently issued by the Federal Power Commission.

It is true that the original draft of the license in question made this company a co-licensee but it was subsequently modified and as finally issued, this company was not a party thereto.

Under our agreement with the Nevada Irrigation District this company will take delivery of water from the District at Spaulding and route same through our conduits and power houses for the generation of power, paying to the District an agreed upon price for such usage.

I give you the above information because the inference to be drawn from reading the article in question is that the license might have been accepted in its original form.

Yours very truly,

P. M. DOWNING,

Vice-president in Charge of Electric Construction and Operation, Pacific Gas and Electric Company.

San Francisco, Calif.,
Dec. 21, 1925.

MYSTIC LAKE, a glacial formation in the Rockies of southern Montana, now furnishes 12,500 kw. to Montana industries.

Rocky Mountain Lake Tapped Beneath Surface in Power Development

THE Mystic Lake power development of The Montana Power Company marks a step in the eastward growth of the load of that company. The project utilizes a natural storage basin formed ages ago by glacial action. Unique in the annals of Pacific Coast power development is the driving of a 1,000-ft. tunnel through a solid-rock knoll and into a lake 41 ft. beneath its surface. The interesting features involved are described in this article.

AN eastward trend in the growth of the business of The Montana Power Company and an increasing demand for better service caused that company to develop its Mystic Lake power site. This particular development was selected as being the most logical after a survey and study of other possible sites in the eastern part of the state had been made. Buffalo Rapids near Miles City, Mont., and a site on the Big Horn River some 60 miles southeast of Hardin, Mont., gave way to the Mystic development.

Mystic Lake is the largest of a string of six lakes on the west Rosebud tributary to the Stillwater River. It is about 45 miles southwest of Columbus, Mont., the nearest railroad point. Preliminary investigations of this project were made as early as 1913 by A. C. Pratt, electrical engineer, and F. W. Bird, civil engineer, of the company's engineering department. The maximum depth of the lake is unknown, but it has been sounded to a depth of 183 ft.

The natural outlet of the lake is over a massive dyke of quartzite granite. This mass of rock apparently was too much for the glacial drift that at one time gouged out the depression which Mystic Lake now fills, hence the natural barrier. The elevation of the crest of this natural dam is about 7,650. From this point there is a precipitous fall of some 300 ft. At the highest and extreme southern end of this drainage basin is the "Grasshopper Glacier," which heads the principal tributary to the lake.

This glacier is of itself peculiar and interesting. It gets its name from the fact that untold numbers of grasshoppers, butterflies and other insects are imbedded in it. Authorities disagree over the probable origin of these insects. Some state that they are prehistoric while others point out that the stratified nature of the insect deposits would tend to show that these deposits are annual and caused by the downdraft of air over the glacier which would bring down passing swarms of the insects each season.

The total drainage area which supplies Mystic Lake is about 50 sq. miles and the over-all average discharge is 165 sec.-ft. This discharge will vary from a normal minimum of some 40 sec.-ft. in the cold winter months of December, January and February to a normal maximum of perhaps 900 sec.-ft. during the months of June and July. Some 45 in. of precipitation is necessary in a year's time to produce the 165 sec.-ft. average run-off. No increase over natural storage resources is contemplated for the present. However, there are possible dam locations whereby the greater part of the total precipitation may be stored in the several lakes and released as desired instead of running to waste as it now does. With these engineering features in mind, the project was developed to utilize a maximum discharge from the area of 150 sec.-ft.

Mystic Lake itself is about 1¾ miles long and ⅜ mile wide. Its surface elevation is 7,650 and its surface area about 347 acres. With the present construction the maximum storage available is 12,700 acre-ft. Within the next two years it is contemplated to increase this figure to 20,500 acre-ft. by the construction of an arch dam across the present outlet that will raise the water level some 20 ft.

General

Before any work could be done on the project itself it was necessary to construct 15 miles of private highway from the nearest county highway point at El. 3,900 to the power house and camp site at El. 6,550. This road was laid out with maximum grades of 5 per cent, as all material entering into the construction of the project had to be hauled over it on trucks and during all kinds of weather. The cost of the highway complete with necessary surfacing, fences, gates and cattle runs was nearly $75,000. Construction work was begun on the road in the fall of 1921 and was completed in May, 1923.

During the road construction period the engineering work in conection with the power development also was carried forward. As soon as the road was completed the contract was let for the construction of the pressure pipe line grades from El. 6,550 to El. 7,560. This grade is 2,700 ft. long and was designed to carry the pressure pipe and a construction tramway of 3-ft. gage as well. From the head of this rise a bench 9,000 ft. long, 12 ft. wide and on a grade of 0.4 per cent was cut from almost solid rock to provide support for the wood-stave pipe line and the 3-ft. gage track from the head of drop to

the lower tunnel portal. This work was started early, supplies and equipment being transported on pack animals. Nearly 100,000 cu. yd. of material were removed in the making of this bench.

Following the completion of the road and the pressure-line grade, a 50-hp. gasoline hoist was brought in, dismantled and hauled to the top of the incline partly by pack animals and partly by block and tackle. There the hoist was reassembled and the work of constructing the tramway begun from the bottom. At the same time a pole line was erected from the power house site to the top of the incline. In the summer of 1923, a transmission line was built from the Red Lodge and Bear Creek coal mining districts into the camp to supply the power necessary for construction. This line came in at 50 kv. to a transformer station at the power house site. A 125-hp. electric hoist then replaced the gasoline hoist in serving the incline tramway. All of the material for the upper end of the job was taken up over this incline and then transported along the upper level by means of a Fordson tractor mounted upon a special locomotive frame adapting it to use on the 3-ft. gage tramway line. It was not long before this means of transportation caught up to and replaced the pack trains which had been in use transporting explosives and steel to the benching crews.

From the description so far, it will be apparent that the hydraulic development was primarily a "one-ended" job. All work had to start at the power house end and progress through to the actual tapping of the lake. This necessitated careful planning and careful handling to maintain the proper sequence without any interference.

Tunnel

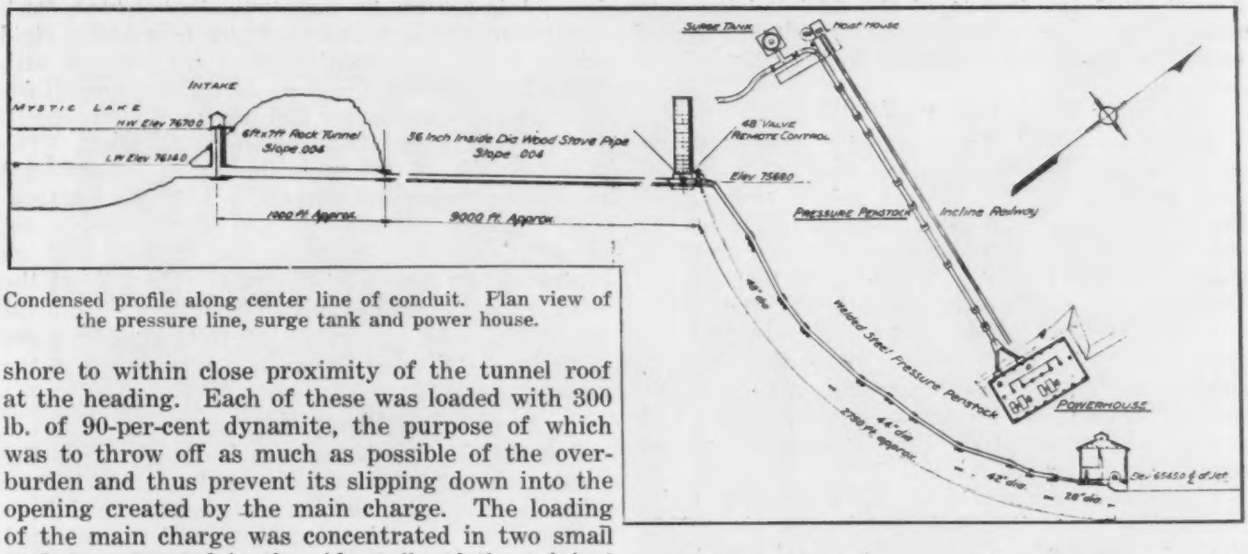
At the upper end of the flow-line grade a tunnel 1,000 ft. long and 6 x 7 ft. in cross-section was constructed to pierce a rock knoll and tap the lake 41 ft. below the surface, at El. 7,608.75. It was realized early that the tunnel presented the largest single item of the entire project, and probably would take as much time to construct as all of the balance of the work. Therefore, early in 1923 the contractors hauled to the lower portal site by means of block and tackle two small fuel oil compressors. An operating camp was established at this point, too, and all supplies for the operation were carried in by pack train from the "rail head" on the tramway back where benching operations were progressing. Valuation construction time thus was saved.

The quartzite granite rock through which the tunnel was driven was extremely hard and dense, so hard that 16 lb. of 80 per cent gelatin explosive per cubic yard of excavated material was necessary. This is about twice the amount normally required for tunnel work. Two shifts were used and a progress of about 6 ft. per shift was maintained. No timbering of any kind was required until a point about 930 ft. in from the portal was reached. At this point the tunnel struck a large vertical fault plane and water was encountered to the extent of nearly 15 sec.-ft. This unexpected event caused a temporary cessation of tunnel construction and a slight revision of plans.

After a thorough study of the geological conditions of the ground adjacent to the fault it was decided to go back about 65 ft. in the tunnel and start a branch tunnel heading, bearing some 40 deg. to the left of the original which had run into the water flow. Accordingly a pilot tunnel 3 x 7 ft. in section was branched from the main tunnel to a point some 22 ft. from the main tunnel and thence parallel to the main tunnel. This pilot tunnel was driven successfully to a point within 40 ft. of the lake bed and practically no water was encountered. The original tunnel apparently had relieved most of the water pressure in the fault and served to drain the fault sufficiently to permit work being carried to a successful conclusion in the branch tunnel. As soon as it was apparent that the pilot tunnel was successful it was enlarged to normal dimensions of 6 x 7 ft. in section.

The very nature of this feature of the project seemed to preclude the possibility of following definite, predetermined plans. Hence it was necessary to have frequent engineering conferences to decide upon the proper course of procedure. As the branch tunnel approached the point where original plans had called for the location of the gate control shaft, two possible methods of attack had to be chosen between. One of these was to raise the shaft from the tunnel level to the surface above the shore line of the lake. Then to make a surface cut from the shaft to the lake shore and gradually deepen this cut, draining the lake through it as it was lowered. The second of the possible plans called for an attempt to advance the original tunnel through the fault in the face of the 15 sec.-ft. flow of water and extend it to a point as close as possible to the lake bed at that point. It was believed that no more than the 15 sec.-ft. of water would be encountered at least until the bed of the lake was approached closely. When the tunnel was driven as far as possible this latter plan considered the expedient of blasting the final opening into the lake at the tunnel El. 7,608.75, and allowing the lake to be drawn down through the resulting opening. At the same time this plan would permit the sinking of the shaft from the surface where the muck could be handled by a derrick which had been installed over the workings instead of having to be handled through the 1,000-ft. tunnel. This latter plan finally was adopted and the original tunnel advanced to within 11 ft. of the lake bed. During this work a pilot drill hole was kept continuously from 15 to 18 ft. ahead of the working heading. This was done to prospect for other possible water-bearing strata and to assure that no error in lake bed calculations had been made. No difficulties were encountered.

When the original tunnel had reached a point where its roof was within 11 ft. of the lake bed, preparations were made for the final blast. Under the direction of a service man from the du Pont Powder Company, some 2¾ tons of 90-per-cent dynamite was placed to move the 700 cu. yd. of material remaining. In addition to this, five 6-in. holes were drilled down from a point near the lake



Condensed profile along center line of conduit. Plan view of the pressure line, surge tank and power house.

shore to within close proximity of the tunnel roof at the heading. Each of these was loaded with 300 lb. of 90-per-cent dynamite, the purpose of which was to throw off as much as possible of the overburden and thus prevent its slipping down into the opening created by the main charge. The loading of the main charge was concentrated in two small pockets excavated in the side walls of the original tunnel and close to the heading. From these pockets radiated horizontally some thirty holes extending 10 ft. further toward the lake. These were loaded with 90-per-cent dynamite to assist in the severance of the material to be moved by the shot.

During the preparation of this shot three bulkheads were placed in the tunnel. One of these was located at the junction of the original with the branch tunnel and was designed to close permanently the original tunnel as soon as the lake level had been drawn down sufficiently to permit construction of the headworks. The second bulkhead was intended to prevent water flowing back into the branch tunnel during the draw-down period. The third was installed at the lower portal and was designed to close the tunnel tightly. After the loading had been completed the tunnel was filled with water to act as backing for the shot.

To insure the positive firing of all charges three separate firing systems were installed. These were a series system, a parallel system (both electric), and a Cordeaux fuse system ignited electrically at the ground surface. The Cordeaux was installed as a precaution against possible water difficulties in the electric circuits. The shot was fired at 2:40 p.m. Sept. 25, 1924,through the closure of the 440-volt control circuit by M. E. Buck, general superintendent. The third bulkhead at the portal 900 ft. away was carried away, the initial failure apparently being toward the lake. Attendant preparation and the shot itself cost about $50,000.

Complete success was achieved as far as making an opening into the lake was concerned. However, the nature of the opening was not what had been hoped for and was not entirely satisfactory. Many large rock fragments settled back into the opening and partially blocked it. It was possible to draw down the lake to the desired level only after an 18-ft. open cut was made in front of the shaft which had been constructed down the branch tunnel as the water level dropped. In view of the expense and the difficulties entailed in drawing down the lake these last few feet via the open cut method, all concerned were completely satisfied with the explosion method chosen. If the former plan of accomplishing the entire draw-down by means of an open cut into the shaft had been adopted construction time would have been lengthened at least four months.

After the lake was drawn down to the minimum possible level a cofferdam was constructed and the necessary concrete work carried on behind it. As this portion of the work was undertaken during the winter months, the inflow was at a minimum and it wes nacessary to open the cofferdam to re-drain the lake only about once in four weeks. This fair progress was possible without water interruption. The tunnel was lined for a distance of 85 ft. from the intake gates on account of the unsatisfactory condition of the ground passed through. The entire headworks concrete structure, including the tunnel lining and the control shaft, was completed in about 60 days. The head gates were ready for service March 10, 1925.

All of the concrete was handled and mixed in a plant located on the hill above the entire workings. Raw materials in sufficient quantities had been developed, washed and stored at the lower end of the lake. These were delivered to the mixing plant as needed. The storage bins at the plant were heated by means of 2-in. steam pipes laid on the floor of the bins. Steam was supplied from a 15-hp. boiler which also supplied the hot water for the mix. Material was delivered to the forms at an average temperature of 50 deg. F. All of the form work was well housed and protected and heated by means of salamanders and electric space heaters. The resulting job was entirely successful even though the weather was severe at times.

The intake gate is of wood suspended from a steel stem the upper end of which is connected to a worm-gear electric hoist controlled from the power house. This distant control is effected by means of a polarized relay connected to the telephone line between power house and head gate station. The relay is actuated by impressing 120 volts d.c. to the telephone line. Conditions are such that the operation of the telephone lines is not affected seriously. The trash racks are sheathed over to

a level below the surface of the lake and the gate chamber thus enclosed, together with the motor house, is electrically heated during the winter months.

Pipe Line

At the lower end of the tunnel a steel band was concreted into the tunnel portal to form the transition between the tunnel and the pipe line. In the concrete block and just ahead of and below the steel connection is located a sand trap and an 18-in. sluicing valve. To assure a tight joint between the rock and the concrete transition block grout pipes were cast into the block. After the block had set, grout was forced through these pipes under a pressure of 80 lb. This same procedure was used for the tunnel lining at the intake end where the bad ground was encountered. Only about 250 sacks of cement were required for this job.

To the steel connection at the lower end of the tunnel was joined the 56-in. wood-stave pipe. This pipe was constructed by the Continental Pipe Company of Seattle under contract. The wood staves are 2⅛ in. thick by 5½ in. wide. Thirty-four staves are used in the roundabout. A spacing of 3½ in. is maintained for the ⅝ in. round steel bands for the first 4,000 ft. from the tunnel connection. Beyond that point the spacing is 3 in. The power company furnished the pre-cast concrete saddles and 13 special steel angle sections. It was cheaper to use these steel angle sections than it would have been to have removed the material necessary to have provided a right of way with the necessary long-radius bends required for continuous wood-pipe construction.

Connection between the wood pipe and the steel angle sections is effected by the use of pure para rubber gaskets about ⅜ in. in diameter. Three gaskets are used for each joint, the first being placed 1½ in. from the end of the wood; the second 3 in. from the first and the third 15 in. from the second. The total lap of the wood over the steel is about 30 in. By drawing down the wood by means of the encircling steel bands these special circular gaskets are highly compressed and formed an excellent water seal for the necessary 70 to 100-ft. head. Two gangs of 9 men each erected this pipe line in 45 days actual working time.

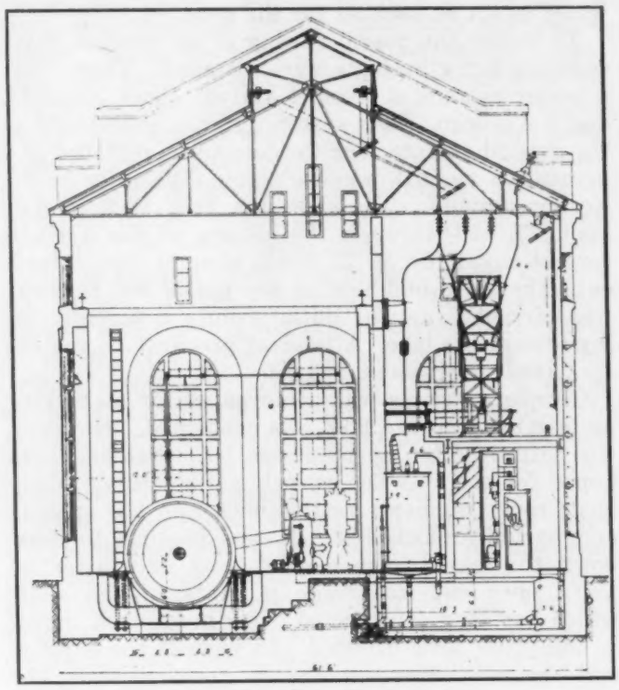
At the lower end of the wood pipe is a special T fitting one end of which connects to the pressure pipe and the other end of which connects to a Johnson surge tank designed to care for pressure fluctuations in both the flow line and the pressure line that might be caused by load variations at the power house. The same rubber-gasket joint construction was used for the T connection to the wood pipe as was used at the various angles. From the T the pressure line is of Kellogg butt-welded steel pipe 48 in. in diameter and 2,700 ft. long. The thickness of the pressure line varies from ½ in. at the top to 1¼ in. at the bottom where the pressure guarantee is 650 lb. Pipe sections are about 20 ft. long and each joint is so made that there is no reduction in effective area at the joints.

Concrete footings support the line and ten expansion joints provide for longitudinal movement. Each expansion joint is midway between permanent, rigid anchor piers. Intermediate piers are provided with roller bearings for the pipe to facilitate readjustment and to reduce wear and tear on the pipe itself. These bearing piers are placed 20 ft. apart. The lower 400 ft. of the pipe line is in a back-filled trench and hence not subject to extreme temperature changes. This section of the line is not mounted on roller bearings, but is supported on concrete piers spaced 20 ft. apart. The gate at the intake and the 48-in. butterfly valve at the point where the wood pipe joins the steel pipe both are electrically controlled from the control board in the power house.

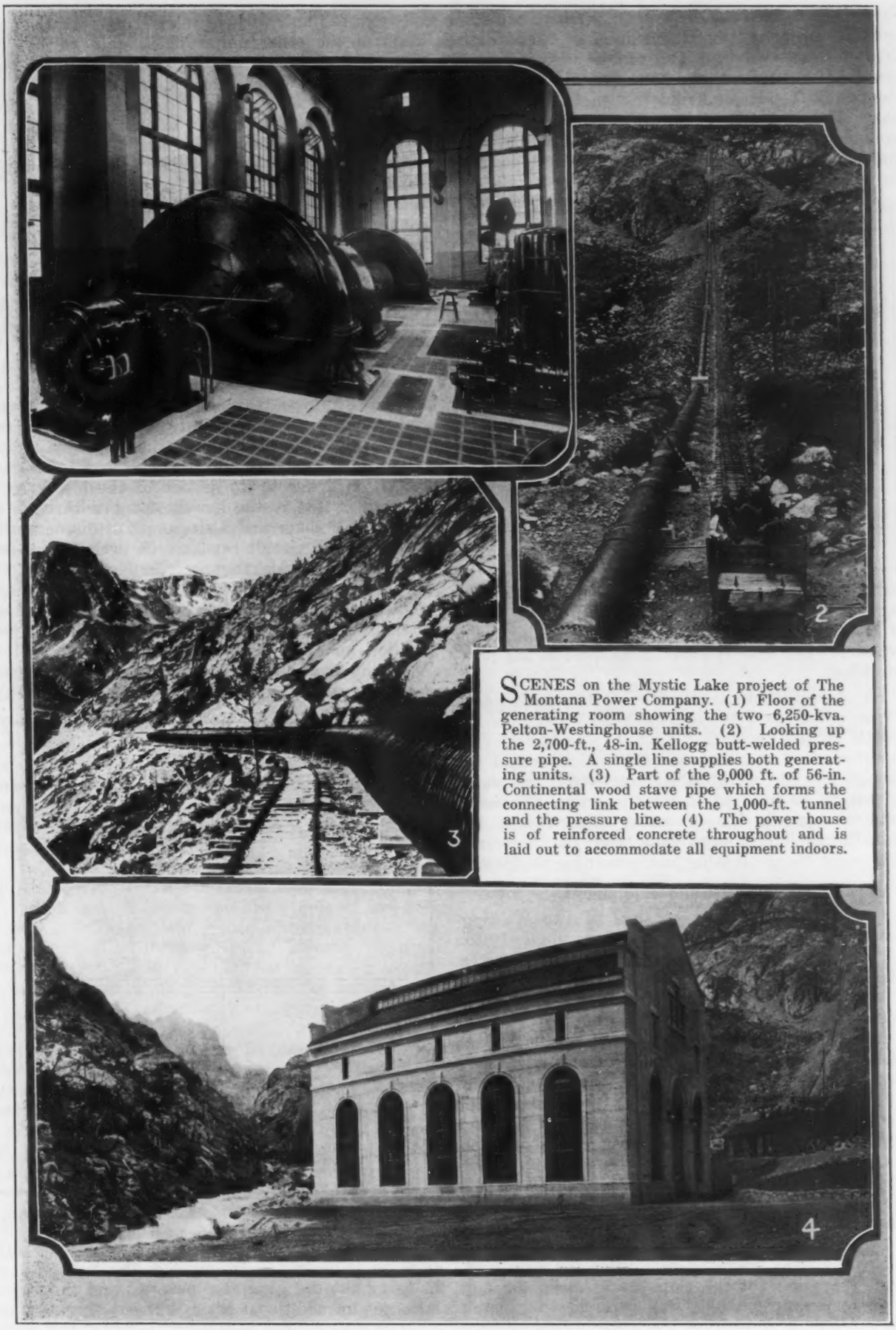
Power House

Reinforced concrete was used exclusively in the construction of the power house. This material was selected after an extensive investigation had been made of the possibility of using native rock and also brick. The native rock is difficult to face and brick delivered to the job would have cost $50 per thousand. The building is approximately 60 ft. wide and 85 ft. long. The main operating floor is 35 ft. wide and 84 ft. 6 in. long. On this main operating floor are mounted the two generating units with their direct-connected exciters, the governors and governor oil-pump equipment and an auxiliary motor-driven exciter. Nearly opposite each generator and on the penstock side of the building are the 8 x 14-ft. transformer bays. Between these bays is located the main switchboard and control board. The 6-kv. bus structure, station service bus structure, battery, generator rheostats and other miscellaneous equipment fill the rest of the available space on the ground floor.

A second floor is constructed over that portion

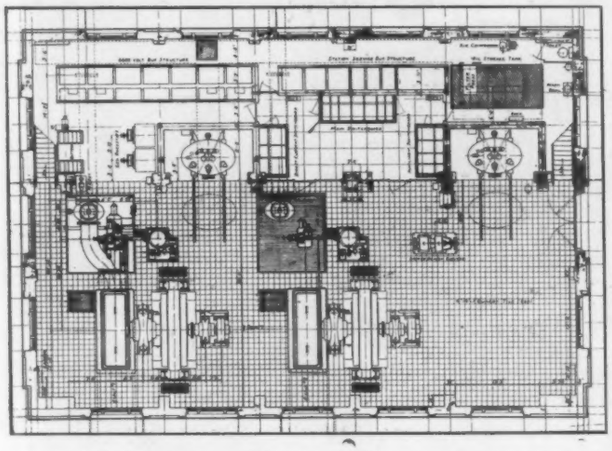


First floor plan of power house.



SCENES on the Mystic Lake project of The Montana Power Company. (1) Floor of the generating room showing the two 6,250-kva. Pelton-Westinghouse units. (2) Looking up the 2,700-ft., 48-in. Kellogg butt-welded pressure pipe. A single line supplies both generating units. (3) Part of the 9,000 ft. of 56-in. Continental wood stave pipe which forms the connecting link between the 1,000-ft. tunnel and the pressure line. (4) The power house is of reinforced concrete throughout and is laid out to accommodate all equipment indoors.

occupied by the transformers, switchboard and other similar equipment on the main floor. The entire high tension switching and control bus and equipment is located on this second floor, indoors. This floor is 22 ft. wide and runs the length of the building. The roof trusses overhead and the building columns at the walls mark this space off into five natural divisions. The two end spaces are occupied by the high-tension oil circuit breakers on the two



Section through power house at generator position.

outgoing lines. The center division provides the necessary space for a third and future line. One of the remaining spaces is filled by the lightning arrester. The fifth space is unoccupied at the present time.

For the convenient handling of the equipment a 40-ton crane spans the operating floor and runs the length of the building. Each transformer is mounted on a car the rails for which extend far enough into the operating room to enable the transformer to be brought under the crane. There is nothing beneath the operating floor except the transformer oil storage tank and the necessary pits under the generating and governing equipment.

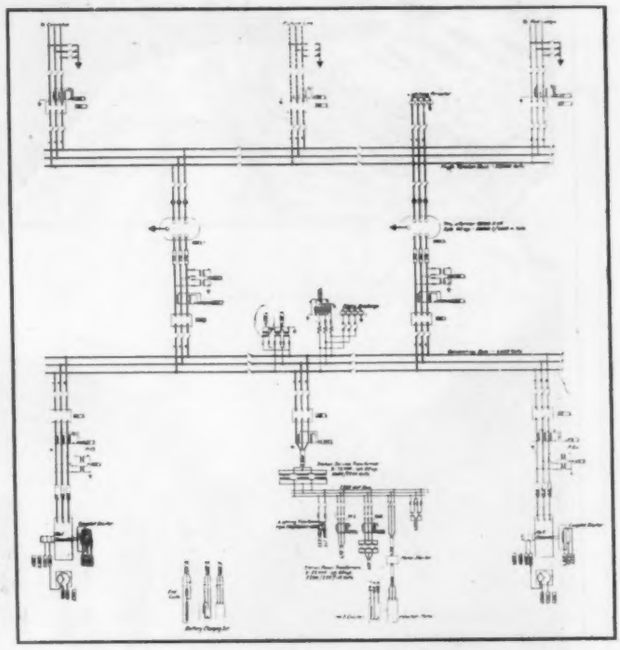
Machinery and Equipment

Generating equipment consists of two Westinghouse generators each driven by a single Pelton wheel. The rating of each generator is 6,250 kva. at 0.8 power factor, 3 phase, 60 cycle, 300 r.p.m., 6.6 kv., while the rating of each wheel is 7,500 hp. at 300 r.p.m. under an effective head of 1,010 ft. The water wheels are mounted directly on the flanged end of the generator shaft and the arrangement makes a neat, compact, two-bearing unit. The shaft is 18 in. in diameter and the bearing that carries the overhung water wheel is 40 in. long. All bearings are water cooled. The usual arrangement of interconnected, interlocked main and by-pass needle nozzles are controlled normally by the belt-driven oil-pressure governor, but may be controlled by hand when necessary. Immediately ahead of each nozzle between the unit and the penstock is located a 28-in. hydraulically operated gate valve for each unit. Since the water for the plant comes down through a single pressure line it was necessary to install these valves in order that the water might be shut off from one unit without interfering with the operation of the other unit. These gate valves were especially designed and built for this application by the Pelton Water Wheel Company.

Each of the two main direct-connected exciters and the spare motor-driven exciter are rated at 50 kw., 125 volts. Each is sufficient for two generators. Two 6,000-kva., 3-phase, 60-cycle, oil-insulated, water-cooled 6.6-6.9-7-2-kv. delta/55-kv. Y, Westinghouse transformers, one for each unit, are connected between the low-tension and the high-tension buses.

Electrical Arrangement

Each generator is tied to the single low-tension bus through a General Electric oil circuit breaker and a single set of disconnecting switches. The low-tension bus is sectionalized by two sets of disconecting switches so arranged that the station service transformers may be fed either from one generator or the other should it be desirable or necessary to kill one end of the bus at any time. Each transformer is tied solidly through a set of disconnecting switches to its section of the high-tension bus and is tied to the low-tension bus through an oil circuit breaker and a single set of disconnecting switches. Oil circuit breakers on each of the outgoing lines provide the necessary control for the proper handling of power. Here again, two sets of disconnecting switches divide the bus into three sections, one for each transformer and each line position and one in between for the future line. With this arrangement it is possible to operate each generator as a separate unit clear through to



Wiring diagram showing electrical arrangements.

the outgoing line should such a scheme of operation be expedient. To obviate the necessity of bringing out the generator neutrals and the installation of an additional set of current transformers a set of power directional relays provides the equiv-

alent of differential protection for the generators. Overload protection also is provided on the outgoing lines.

All three exciters may be connected to a common exciter bus through the necessary switching and control equipment. However, normal operation calls for each direct-connected exciter to carry its own generator except in emergencies when the spare exciter may be called upon to carry one or the other of the generators. In this way it is possible to provide spare exciter service with a minimum size and amount of machinery.

A single aluminum-cell lightning arrester is connected to the high tension bus. Operating experience over a period of years with the company seems to have shown that this type of lightning arrester installation is satisfactory.

Conclusion

After having stood for five months the pipe line was filled with water March 15, 1925. Within a week practically all of the leaks which originally showed had closed of their own accord and it was necessary to give special attention to only a very few. During the following 48 hours the pressure line was filled gradually up to the full static pressure of 450 lb. No leaks developed. After a 36-hr. run-in period the first unit was synchronized on the line with the rest of the system at 8:40 a.m. March 20, 1925. The second unit followed shortly afterward and both have been operating nearly continuously since that time.

New Method of Merchandising Ranges

AN entirely new idea in the merchandising of electric ranges has been developed in Winnipeg, Canada, where 4,330 ranges have been added to the lines of the city "Hydro" within the period of a year and a half. The present record is 19,000 electric ranges on the city lines, with a city population of only 200,000.

The selling campaign has divided itself into two major divisions. To individual consumers ranges, including installation, are sold at $15 down and $5 a month. To apartment house owners, ranges are rented, or virtually sold on an eleven-year basis without any initial expense for wiring or equipment.

An extensive advertising campaign carried on among apartment house owners and also among those who rent apartments has been largely instrumental in bringing about this result. Billboards in conspicuous locations throughout the city and letters addressed to tenants were among the methods used.

The scheme in brief is this: Any apartment house owner, which means the owner of any rented quarters from a double house up, may have ranges installed in his apartments free of charge upon signing an eleven-year contract by which it is guaranteed to pay 1 cent additional for every kw-hr. used on the range during that period. The domestic rate for electric cooking in Winnipeg is 1 cent per kw-hr. with a 10 per cent discount, or net .9 cent per kw-hr. and the additional charge brings the figure up to 1.9 cents per kw-hr., leaving the operating cost of the range still below that which is possible with gas. During the period of the contract, the owner may purchase the ranges upon payment of the retail price minus a depreciation charge of ¾ of 1 per cent per month for every month the contract has been in operation. In other words, the ranges mechanically become the property of the owner in eleven years' time.

Recently the scheme has been slightly modified so that the owner pays for the wiring, either outright or on a ten-year basis, paying $10 down and $2.70 every half year. Instead of the kw-hr. basis of payment, an equivalent sum of $1 per month on all ranges costing $70 or under, or $1.25 on ranges costing more than $70 is charged.

Three types of ranges are sold at prices ranging from $65 to $92.50. These were selected after severe tests to determine the most durable equipment and that requiring the least maintenance. Records kept on one of the types of range used are said to show a cost of maintenance to the city department of 1.7 cents per month per range. In figuring the merchandising returns from the plan, $1 a year per range has been allowed for maintenance costs. Ranges are sold at wholesale prices plus a $7 handling cost.

The investigating committee which sanctioned this plan of merchandising on the basis of its financial returns submitted a report which purports to show an annual merchandising profit to the city of some $5,800 on 5,000 ranges, not to mention the return in the current consumed, which it is figured amounts to $140,000 annually. The ranges are to be paid for in eleven years time, with a 5¼ per cent interest return on the investment during that period. The figures follow:

Cost of 2,500 stoves at $70	$175,000.00
Revenue	Per Year
2,500 stoves at $1 per month or $12 per year	$ 30,000.00
Expenditure	
Interest at 5¼ per cent	9,187.50
Sinking fund, 11 years	12,644.00
Maintenance at $1 per stove	2,500.00
10 per cent vacancies	3,000.00
	$ 27,331.50
Annual estimated profit	$ 2,668.50
	$ 30,000.00
Cost of 2,500 stoves at $90	$225,000.00
Revenue	Per Year
2,500 stoves at $1.25 per month or $15 per year	$ 37,500.00
Expenditure	
Interest at 5¼ per cent	11,812.50
Sinking fund, 11 years	16,258.00
Maintenance at $1 per stove	2,500.00
10 per cent vacancies	3,750.00
	$ 34,320.50
Annual estimated profit	3,179.50
	$ 37,500.00

The small profit, it is figured, will be sufficient to care for under-estimations or unforeseen contingencies.

Utility Company Sells Itself by Means of Small but Effective Window Display

WINDOWS of power company offices have been used for the effective display of merchandise, for the sale of appliances, and occasionally for simple decorative effect, but it is not often that imagination and creative effort are used to make of windows potential good-will builders of educational exhibits. Yet in the case of the Southern California Edison Company, in the small window near its Los Angeles main office building entrance, such window displays have demonstrated that the thing can be done and done exceptionally well.

Originally the small window, located on the Third Street side of the Edison Building, about 25 yd. from

A display featuring equipment used on the pioneer 220-kv. line.

the corner of Broadway, Los Angeles' main thoroughfare, was put into use to stimulate the sale of securities. Gradually, however, with the idea growing of its own momentum, less and less direct reference has been made to the securities sale feature, and more and more emphasis has been laid upon the physical properties forming the background of the organization.

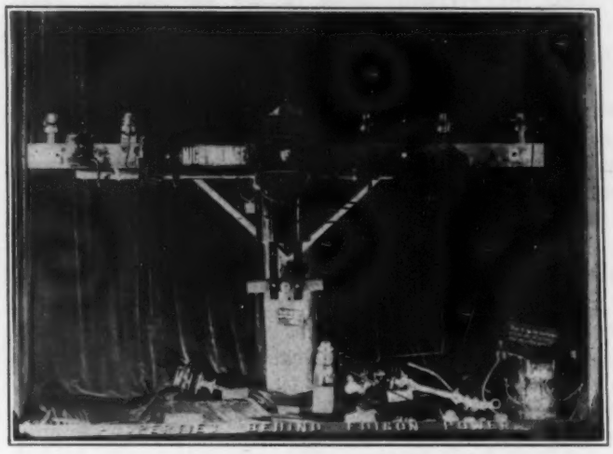
Telling and selling the story of the properties back of its project, the Edison company has with these cleverly arranged window displays evolved a highly satisfactory form of publicity. For a central-station company with no merchandise to sell at its main office, the adoption of this method of putting its story before the public is therefore distinctly unique.

The window is very small. It is but 9 ft. wide, 8 ft. high and 2 ft. deep. Yet by ingeniously designing the displays and capitalizing to the utmost the human interest features of the company's work, they have been distinct attention provokers.

For night illumination ten 100-watt lamps in Holophane reflectors are used. The lights are arranged to flash on and off at 30-second intervals. Colored lighting sometimes is used for some window arrangements to bring out color values to best advantage. The displays are changed about every two months, the thousands of people who pass them daily being given full opportunity of seeing the displays so carefully and painstakingly prepared.

The first displays dealt with securities of the company, an enlarged photograph of a stock certificate, and various other graphic illustrations relative to stock distribution making up the display. From this the displays took a turn toward properties themselves. The equipment used in stream gaging to measure water flow to the Edison Big Creek plants was used, each article clearly labeled and explained. Another display was made up of various types of residence and power electric meters, together with testing apparatus for determining their accuracy, and photographs of meter-testing, laboratories and methods. A typical pole top, each lead labeled and explained, made another fascinating "attention-getter," for few people know what all the apparatus at the top of a pole is, or what it is for, and are often curious to know. Types of buckets, with pictures of the units on which they are used, made an interesting "inside" display of water-power turbine mechanism.

Among the most effective displays of this nature were those of the 220-kv. line, and especially so was that dealing with the progress of the Lake Florence tunnel job. Effective charts, photographs, actual rock drills and samples of the granite from the tunnel gave the display unusual interest. And a rather subtle comparison of the time taken to drill this tunnel as compared with that taken to drill the distance between two Los Angeles streets, through which the city was having built a short traffic tunnel that was despaired of ever being finished, gave just the right "tang" to this evidence of the achievement of private initiative in a bigger undertaking.



A typical pole top on a distribution line makes an attention-getting display.

HOW well a central-station company, without merchandise to sell, may utilize its windows for selling itself to the public it serves, is demonstrated in these displays from the small window of the Southern California Edison Company, near its main office entrance, Third Street, Los Angeles. (1) A display of equipment used in stream gaging in the Big Creek region. (2) One of the original displays, primarily aimed at the prospective security buyer. (3) Various types of buckets used on the water wheels in the hydroelectric plants of the company. (4) Meters and meter-testing apparatus attest to the accuracy of electric meters. (5) The score board of progress on the Florence Lake tunnel job, together with machines used to drill it, and granite from the tunnel. Each window display was designed to explain in simple terms the various objects used in company operation.

Cement Duct as Manufactured and Used in California*

CONCRETE duct has been known and used in California only during the past two or three years. It has therefore been in the experimental stage only as far as this section of the United States is concerned. We understand that in certain sections of the Middle West and of the East, particularly in Chicago, the electric utilities have been using it for a number of years and, in fact, are now using it at the rate of approximately 3,000,000 duct ft. a year in the latter city. (We plan to secure additional data from the Chicago utility, which will help us in our consideration of the subject.)

Its large use by this utility seems to indicate that it has considerable merit, and possibly offers some desirable features and characteristics which justify its use in quantity for underground duct construction. It was introduced into California, not through a demand created by the electric utilities, but through the efforts of certain manufacturers of concrete products to increase their output by reaching out into other fields which had not as yet been touched.

A manufacturer in southern California made up a considerable quantity of duct in an effort to establish a market, but this did not immediately materialize, probably because the utility engineers were just a little skeptical about its application and did not wish to experiment, but chose rather to continue the use of duct with which they were familiar. A manufacturer in northern California started to manufacture concrete duct early in 1924, and in order to determine whether or not this duct could be used to advantage, the Pacific Gas and Electric Company purchased a small quantity, abuot 15,000 linear ft., during that year. This was installed in a distribution system, and an additional equal amount was purchased and installed in the same locality during the following year. Approximately 100,000 ft. are now being installed in another city on a transmission duct line.

Since this new type of duct (new as regards California) is of such recent origin, considerable difficulties have been experienced both in the manufacture and methods of installation. These difficulties have not all been overcome, though great improvement has been made since the first piece of duct was manufactured and it is probable, as time goes on, that the utilities working with the manufacturers will evolve a product which may be considered as high grade in every respect.

Manufacture

While the engineer is interested primarily in the finished product, a description of the methods of manufacture and the difficulties met and overcome may also be of interest. As with all new products concrete duct was not manufactured in perfect and final form from the first.

There are two major characteristics which all duct must possess in order that it may be utilized for electric underground construction. It must have a smooth interior surface and the joints must be such as to continue the smoothness where sections of duct are joined together. There are naturally other conditions which must be met as well, such as strength sufficient to permit transportation and handling; suitable means for connecting sections together; desirable lengths which are not too heavy to handle and not too long to permit turning angles, such as are ordinarily found in underground construction; ease of making repairs in case of necessity; suitable terminal methods in manholes and absence of chemicals which may react on the lead sheath of the cable.

The first two items have caused the greatest amount of difficulty, and the manufacturer has been experimenting continually in an effort to produce a perfectly smooth interior surface, or as nearly smooth as it is possible to make, and also absolutely to center the bore at the ends, and to keep the concrete intact and entirely filled out at those points.

The length has been fixed at 3 ft., as it is found that a greater length will be too heavy to handle easily and does not provide as great flexibility during installation. These 3-ft. lengths weigh about 22 lb. for the 3½-in. size and about 25 lb. for the 4-in. size.

As the duct is now made, the wall is about ⅝-in. thick. This provides adequate strength considering a proper quality of concrete. A thinner wall would be more fragile and the breakage would probably be greater.

The method of joining lengths has been given some study. Paper collars have been employed for the purpose, but it is felt that the tin collars now used in northern California are perfectly satisfactory. These are merely a section of a can of the proper length and diameter. They must be of such length as to permit the sections of duct to come together, and of such diameter as to produce a concentric hole, taking for granted that the bore of the duct is concentric with respect to its external circumference, and also so as not to permit thin concrete mixture or grout to flow into the duct and cause an obstruction. They must, therefore, be as snug-fitting as possible, but not so snug as to prevent readily joining the ends of the duct. This requires a rather exact or close design.

After all, in duct line construction only the holes in a mass of concrete are desired, and any duct which is used acts merely as a form for the holes. Up to the present time it has been found necessary to leave the form in place after joining the envelope. A new method has been invented for removing the forms, thus leaving an absolutely homogeneous concrete envelope. We realize that such a homogeneous envelope is a desirable feature, and it appears that the use of concrete duct as a form approaches this ideal condition.

The duct manufactured in central California is produced on a McCracken machine, which employs a revolving shoe or trowel for the purpose of packing the concrete mixture inside of a metal form. The concrete is mixed in a horizontal, rotary-blade mixer at the side of the machine. After it has been thoroughly mixed, it is dumped into a bin, from which it is carried to the machine by means of a chain conveyor. The metal form is made in two sections which are clamped together and are inserted into the machine in a vertical position. The revolving shoe is started at the bottom of the form and the concrete mixture is fed in at the top. As the shoe revolves it slowly travels vertically up through the form, troweling a layer of concrete on the inside of the latter. The form is then taken out of the machine and one-half is removed, the duct being supported horizontally on the other half of the form, until it has hardened sufficiently to permit it to carry its own weight when stood on end. The ducts are cured and are then ready for shipment.

It will be noted that the smooth interior of the duct is produced by the action of the revolving shoe or trowel. However, it has taken much experiment to reach a degree of smoothness which compares favorably with other types of duct, and which is suitable for the installation of cable. In the first place, the mixture must have exactly the correct amount of moisture content. If it is too wet it rolls up under the action of the trowel and causes sharp edges and considerable roughness, whereas, if it is too dry it does not pack properly and lacks sufficient strength.

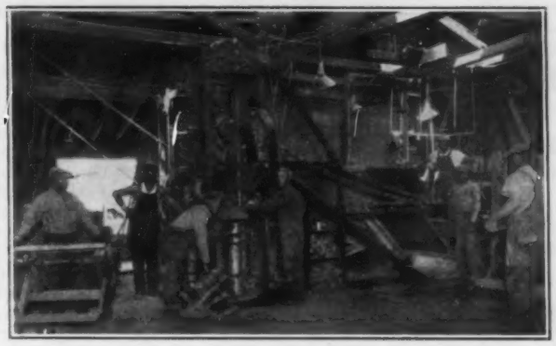
The aggregates also have much to do with the degree of smoothness produced. The manufacturer has experimented with a large number of different aggregates and has been successful in producing a duct which is as smooth or smoother than fiber duct. However, eternal vigilance must be exercised to insure uniformly good quality. Because of the abrasive effect of the aggregate, the shoe wears and produces grooves inside the duct, the edges of which may be rough. The mixture may not pack properly at the ends so that they crack or break off when one-half of the mould is removed. The thickness of the sheet steel forming the mould has much to do with the perfection of the duct. Too thin steel spreads at the joints under the action of the trowel.

The small amount of water which is added also assists in increasing the strength. It has been found that a 3-ft. length, supported on both ends, will easily carry the weight of a man in the center. This readily permits transportation and installation. In addition, the manufacturer found that the speed of revolution

* Serial report of the Underground Systems Committee of the Pacific Coast Electrical Association, presented at the Los Angeles meeting of the Underground Committee, Sept. 25, 1925, by Henry H. Buell, chairman of subcommittee; R. P. Lutzi, H. C. Moyer, all of the Pacific Gas and Electric Company.

and the vertical speed of the trowel has much to do with the quality of the duct produced. If the duct is stood on end when curing under the action of steam and water, the lower end is liable to disintegrate. These are just a few of the difficulties which have been found and corrected.

With one machine and an average crew, it has been possible to manufacture 3,000 linear ft. of duct in one day. This quantity, of course, varies from day to day for different reasons. It has been transported by



Equipment used in the manufacture of concrete duct. The process is described in the accompanying article.

truck and trailer from the factory to the job, at the rate of about 2,500 to 3,000 linear ft. per load over a distance of 50 miles with a very small percentage of breakage. This is a fairly good indication of its strength.

Installation

So far no particular difficulty has been experienced in installing concrete duct, at least no greater difficulty than is found with other types of duct. Although the walls of concrete duct are thicker than fiber, for instance, the spacing between duct and the outer envelope can be made slightly smaller to compensate for this extra thickness so that the trench need not be any wider. When the sleeves or collars are the correct diameter, a man can readily joint the lengths. In fact, this is probably a simpler matter and more easily done than with other types of duct.

The method employed is the same as heretofore used by everyone doing underground construction. The trench is prepared of correct width and with smooth floor. A layer of concrete is poured, a layer of duct placed and these are covered. Another layer is placed and covered, and so on until the required number of duct have been placed, after which the top layer of concrete is poured. The consistency of the concrete should be such as to readily flow around the duct so that it will, to a certain extent, adhere to and become a part of the concrete duct. On the other hand it should be dry enough to permit working on it in a reasonable length of time to install additional layers of duct, and so as not to permit the duct to sink into it.

In some cases spacers have been used to insure perfect alignment of the ducts as they are placed, and these are later removed before the next layer is put in position, but it is not felt that these spacers are necessary. The concrete duct does not float as rapidly as does fiber, which assists in its installation to a small degree.

It has been considered advisable in some instances to rod the duct as soon as possible after it is laid, and to brush or swab out the interior to remove any loose grit or sand which may have accumulated while it was being laid. In order to determine whether or not the joints were smooth and straight a mandrel 3¼ in. in diameter was drawn through the first 15,000 ft. of 3½-in. duct which was laid. It passed perfectly freely through all of it with the exception of one spot where a small amount of grout had seeped in around one of the collars. This happened to be close enough to a manhole so that it could be reached. In any event it was not serious as the cross section was reduced very little and the grout had hardened perfectly smooth.

Comparison with Other Types of Duct

Concrete duct has one marked advantage, other things being equal, at least to those who are located close to the point of manufacture. It can be secured in quantity on very short notice, and there is no need to tie up capital in idle stock. In fact, if the manufacturer does not have stock on hand, he can make it up and deliver it within two weeks very readily, and in case of an emergency it can be turned out sufficiently cured to handle in one week.

The cost of the duct itself has been made practically the same as fiber delivered on the job. Its installation cost, all things considered, is so nearly the same as fiber that it is difficult to distinguish a difference. Often there is a material difference in cost of installation of one type of duct in several different localities because of various conditions, and we have not gone far enough to be able to give comparative figures which would be of value. One Eastern company, which has used a great deal of concrete duct, has its underground construction done by contract. Each contractor bids on three types of duct: fiber, clay and concrete, and their figures are the same for all three.

One Eastern engineer has stated that the heat dissipation through concrete duct systems is practically the same as for fiber duct, and that the heat flow through both is increased as the size of the cable is decreased, the duct size remaining the same.

There is the matter of corrosion of the lead cable in concrete duct. This has always been the major point which has been raised by engineers against the use of concrete. It has, however, been refuted practically conclusively by those companies which have used concrete in large quantities. They have pulled cables which had been in concrete from ten to twenty years and have not found a single case of corrosion.

Naturally, most engineers can cite cases where they know that concrete has caused corrosion, but these cases will be found to cover primarily the use of concrete fireproofing. This is an entirely different matter and is explained by one engineer as follows:

"Cured concrete, that is where crystallization has completely taken place and the cement content has become thoroughly hydrated, has absolutely no detrimental effect on lead, which might be evident had the concrete been placed in contact with the lead when wet and allowed to set, in which case it might be possible for damaging deposits to be made on the

A batch of newly cast concrete duct sections on their way to the curing sheds. The smoothness of the bore of the duct section is indicated by the reflection of light through them.

lead while the process of crystallization was taking place in the concrete."

This explanation seems a logical one, as does the remarks of another engineer, who states that a laboratory test is not at all conclusive since any results can be produced in a laboratory and that experience is after all the best teacher.

Eastern companies have found that there is some abrasion of the lead sheath, but that this abrasion is after all negligible. An examination of a large amount of cable which had been pulled as many as six times showed no cuts in the lead sheath greater than 1/32-in. deep.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

Forebay Gates Operated from Plant Control Board

Dial-Type Selector Switch for Remote Control of Head Gate Motors Uses Minimum Number of Conductors

By T. J. LOVELL, Engineering Department, Southern California Edison Company, Los Angeles

Rather than depend upon telephone communication and a gate tender for the operation of the forebay gates at the Kern River No. 3 plant, a system was installed whereby these gates could be controlled directly from the power-house switchboard. At that installation there were two penstock gates and a relief gate to be controlled. This meant that quite a large number of conductors would be required between the forebay and power house if each gate were to have its own individual set of control wires. A study showed that, with three gates to be controlled, a saving could be made by using a selector switch at the forebay and one set of control leads between forebay and power house. Naturally, as the number of gates to be controlled is increased the saving is increased proportionately.

At the time that plant was designed there were no known devices on the market that would accomplish this purpose reliably. There now are several apparently satisfactory devices. Accordingly, the engineering department developed a dial-type selector switch which has proved very satisfactory in service. Similar installations later were made at Big Creek No. 1, Big Creek No. 2 and Big Creek No. 3 where they control five, five and three gates, respectively.

The selector switch consists essentially of a dial made up of ten concentric rings which are divided into eight sectors, each sector controlling one gate. Five of these rings are continuous electrically, but construction reasons made it desirable to divide all ten rings into sectors. A rotating arm, driven by a 1/20-hp. motor through a train of reducing gears, has five brushes located along its length in such a manner as to connect adjacent rings in pairs, that is, five circuits are closed. One ring of each pair (all eight sectors) is connected permanently to the master control at the power house. Each sector of the other ring of the pair is connected to the individual gate-control mechanisms. Thus it will be seen that when the arm is resting on any particular sector five circuits are completed between the master control and the gate to which that sector is connected. One circuit is for opening, one for closing, one for red lamp (indicating closed gate), one for green lamp (open gate), and one to indicate which particular sector the arm is resting on at any particular time.

Continuity of service could be maintained best by fusing the bus for the gate motors but leaving the individual disconnecting switches to the motors unfused. By installing three lamps at the power house and connecting them in star across the bus at the forebay, a continuous indication as to "readiness to serve" is obtainable at the control board. The blowing of a fuse or an open circuit from any other cause will extinguish one or more of the

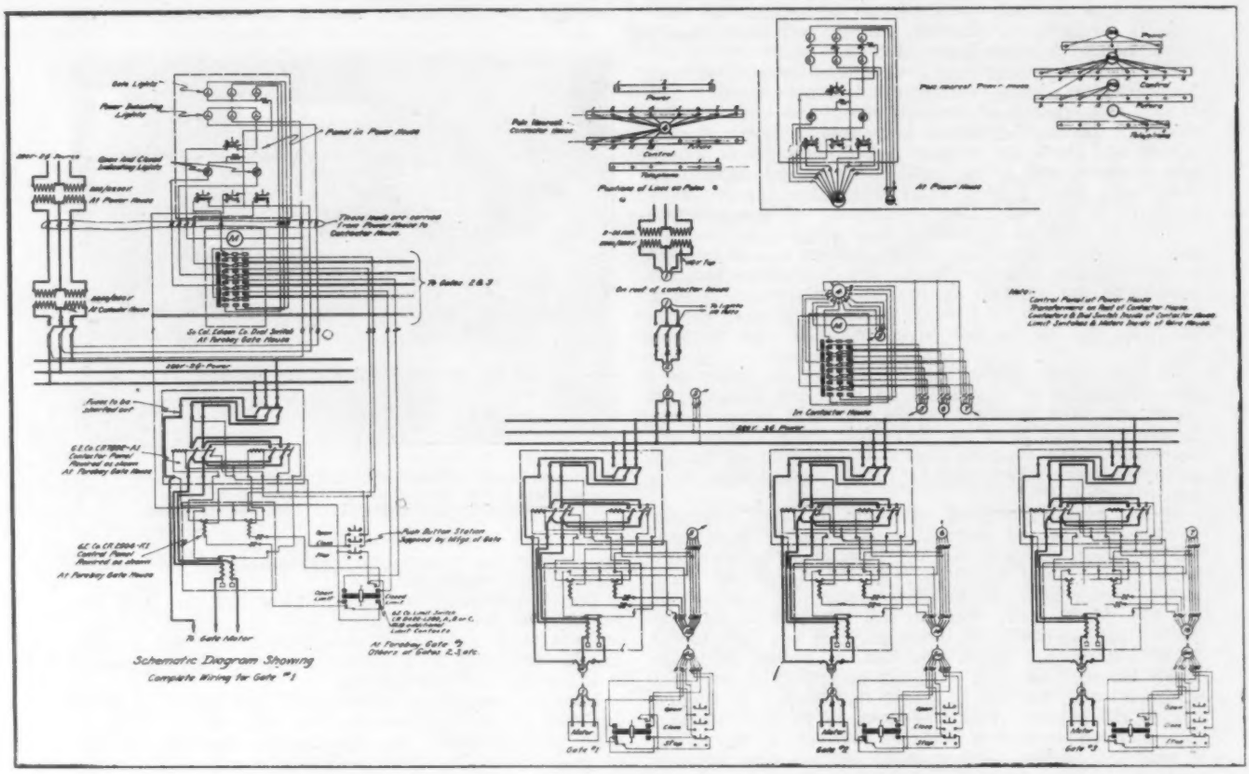


Fig. 2. Three-line wiring diagram of system for remote control of penstock gates. The operating mechanisms are located at the forebay and the control and position-indicating devices are located at the power house bench board.

lamps, and if the trouble is confined to one leg an indication will be given showing the leg in trouble. The operator thus has knowledge at all times as to the readiness of the apparatus to function. He may check the positions of the gates at any time by rotating the dial switch, the indications appearing in sequence as the arm rotates.

The sequence of operation is quite simple. The operator presses the motor button causing the switch arm to rotate. As each position is passed a lamp lights. When he has reached the position desired he releases the button and the arm stops almost instantly. The open (or close) button then is pressed, causing a contactor at the forebay to close and lock itself in that position until released by the action of the limit switch or by the pressing of the stop button at either the power house or the forebay. Therefore it is not necessary to hold the button down until the operation is completed. Consequently the operator immediately may move the dial switch to another position and start another operation. It follows that the entire group may be operated simultaneously by rotating the switch while holding the closing (or opening) button down, causing the contactors to pick up in fairly rapid sequence. The operation of the gate (or gates) may be stopped instantly by pressing the stop button at either the power house or the forebay. Local push-button stations are provided at the forebay with their open and close buttons connected directly to their mechanisms but with their stop buttons in series with the master-control circuit. Thus a gate may be started from the power house and stopped from the forebay station, or vice versa.

In order to prevent operation by unauthorized persons the mechanism at the forebay is enclosed in a building which normally is kept locked. In addition to this the disconnect switch supplying power to the gate motor is arranged to be locked open when any work is being done or any of the equipment pertaining to that gate.

Some time after the installation of these dial switches the company adopted the policy of using the remote control for closing only, making only four circuits per sector necessary instead of five. A method also has been devised since that requires only two wires instead of three for hot-bus indicating purposes. This latter method is used at the Big Creek No. 1 installation.

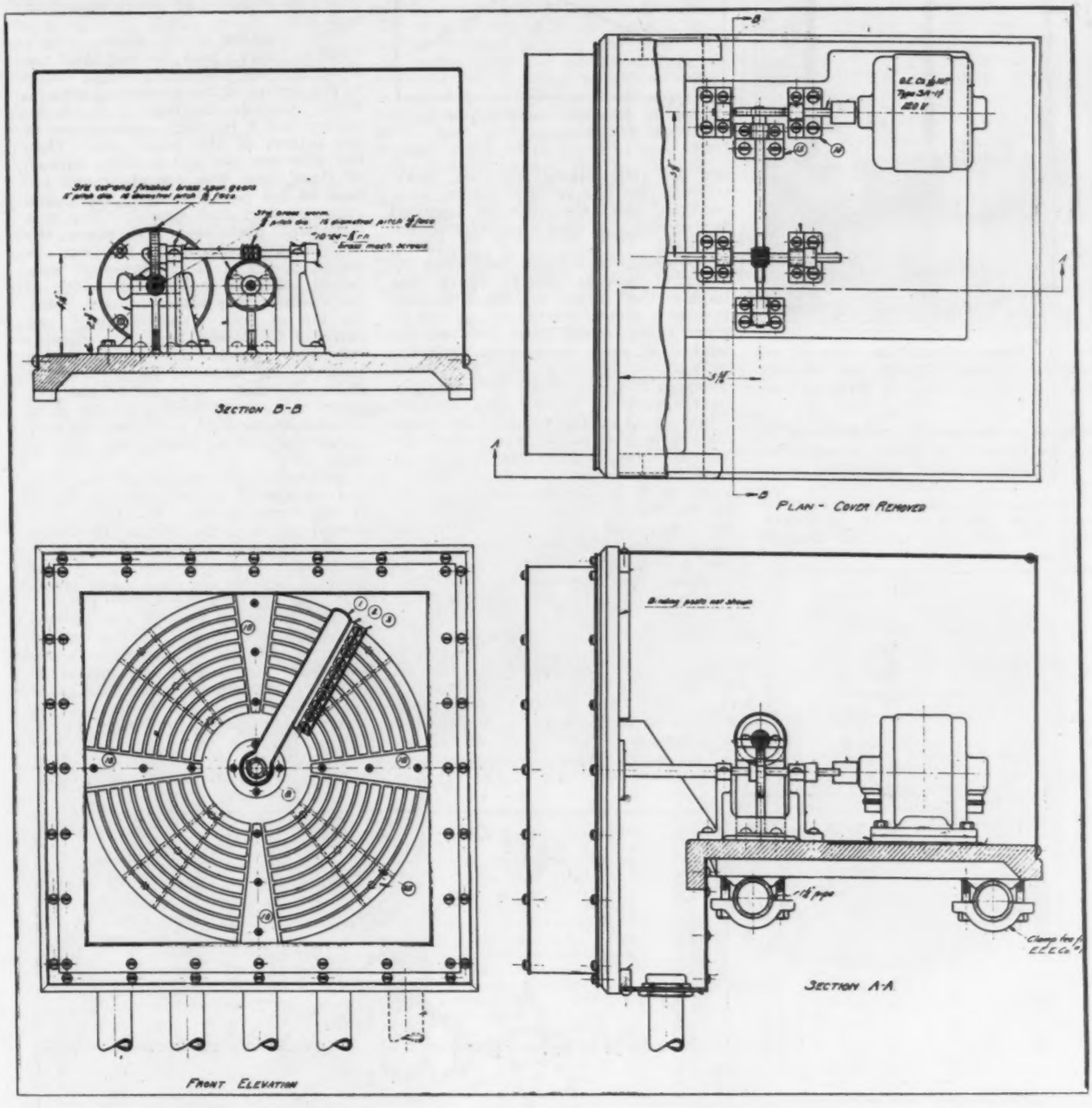


Fig. 1. Elevation, plan and section views of motor-operated dial switch for forebay gate control as developed by the Southern California Edison Company.

Line Troubles Obviated by Use of Single Long Span

By A. G. BETTS, District Superintendent, Puget Sound Power & Light Company, Olympia, Wash.

While an 1,800-ft. span is of no more than passing interest in the light of modern practice, the one in question has solved a rather serious service question as far as concerns Olympia. It

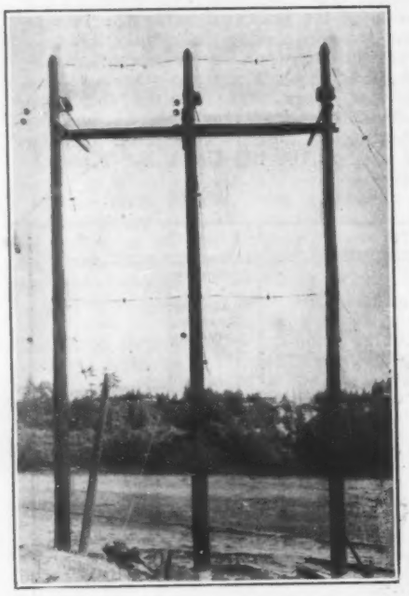


Fig. 1. General view of the lower of two structures carrying a 1,800-ft. span of 55-kv. line across a waterway near Olympia, Wash.

replaces a section of line featured by all the hazards of hasty construction, inaccessible location, dangerous trees, and doubtful property rights. The necessity for a line free from these risks was emphasized in November, 1924, when a large tree fell through

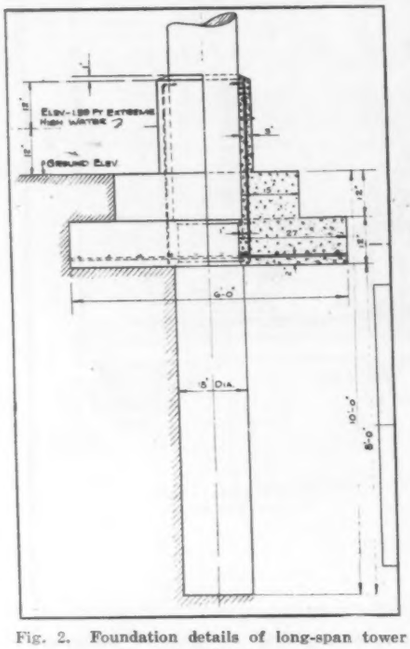


Fig. 2. Foundation details of long-span tower set in an inundated mud flat.

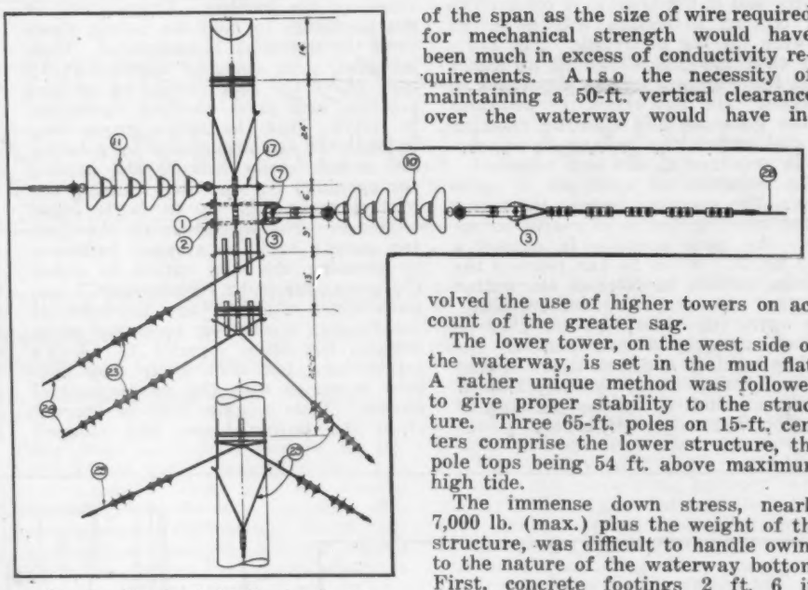


Fig. 3. Structural details at pole top (elevation).

the old line, taking out the 50-kv. transmisison line and two 2.3-kv. feeders upon which the entire city depended for service. A nine-hour interruption resulted.

The choice of a single long span instead of several shorter spans was largely the result of the generally favorable ground conditions. A line on short spans would have involved the setting of poles on a steep declivity, as well as across a mud flat which periodically is inundated by tidewater. To the unstable footing thus afforded would be added the difficulty of access for repair work as well as necessarily high labor costs attendant upon initial construction under these conditions. Further, the difference in elevation of approximately 150 ft. between the upper and lower towers allowed the use of comparatively short poles to support a long span and still maintain the required clearance over the waterway. Fig. 1 shows the span from the lower end.

The stress imposed upon the conductors is the equivalent of that of a span of approximately 3,600 ft. due to the difference in elevation of the towers. Extra-high-strength steel cable 7/16 in. in diameter was used, stressed to a tension of 6,600 lb. at 63 deg. F.

The use of copper conductors would have added materially to the expense of the span as the size of wire required for mechanical strength would have been much in excess of conductivity requirements. Also the necessity of maintaining a 50-ft. vertical clearance over the waterway would have involved the use of higher towers on account of the greater sag.

The lower tower, on the west side of the waterway, is set in the mud flat. A rather unique method was followed to give proper stability to the structure. Three 65-ft. poles on 15-ft. centers comprise the lower structure, the pole tops being 54 ft. above maximum high tide.

The immense down stress, nearly 7,000 lb. (max.) plus the weight of the structure, was difficult to handle owing to the nature of the waterway bottom. First, concrete footings 2 ft. 6 in. square and 8 in. thick were placed at the bottom of the pole holes. Then the pole was set and a 10-ft. caisson of stack steel was placed around the base of the pole and filled inside and out with dirt and gravel. The pole then was chamfered just above the caisson 12 in. wide and 1 in. deep. As shown in Fig. 2, a supplemental reinforced concrete footing the width of the chamfer was placed at that point. On top of this "upper footing" and carrying to ground level is a circular reinforced concrete shoulder, with galvanized iron form, 12 in. deep and 4 ft. in diameter. The base of the pole above the ground level and to a point above extreme high water level is protected by a 3-in. reinforced concrete shell.

On the eastern side of the waterway and on a bluff as indicated in Fig. 1 is the upper tower. This, too, is a three-pole structure similar in design to the lower structure just described. Of course, ground conditions at this elevated location are much more favorable than at the lower tower. Foundations here consist only of a reinforced concrete mat 2 ft. 6 in. square and 12 in. thick set at the bottom of each pole hole. The top of this mat is 10 ft. below the ground line. This gives an effective pole height of 55 ft. and a total height above the waterway of 155 ft.

Side guying of the structure is of importance and the system used is in-

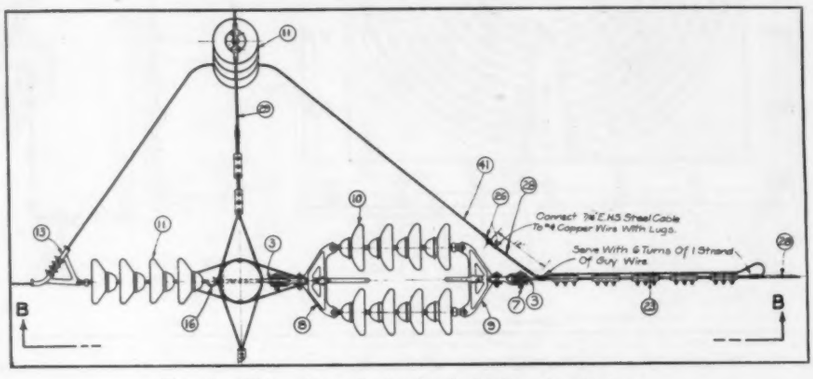


Fig. 4. Plan view of structural details at pole top.

dicated in Fig. 1, the system being essentially the same at each end of the span. Guy wires used are 7/16-in. extra-high-strength stranded steel. Two types of anchors are used. The main upper back guys in each case are carried to an anchor consisting of a 12-ft. cedar log 18 in. in diameter set about 7 ft. (vertically) deep. The other guys terminate at cedar logs 6 ft. long and

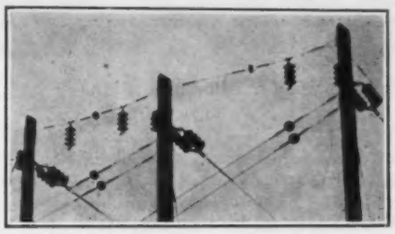


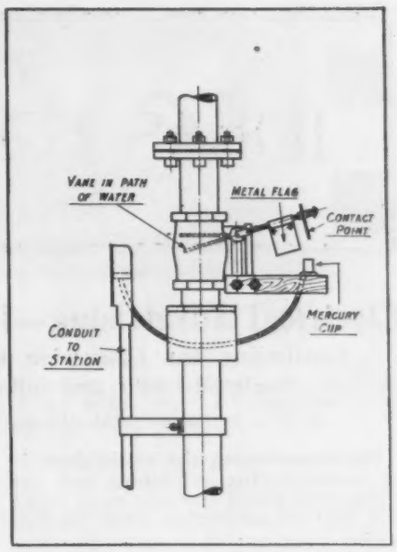
Fig. 5. Showing close-up of insulator layout at top of towers supporting 1,800-ft. 55-kv. span. Connections from the span conductors to the line conductors had not been made when the photograph was taken, but the scheme of carrying conductors through the tower structure is indicated plainly.

12 in. in diameter set from 5 to 7 ft. (vertically) deep.

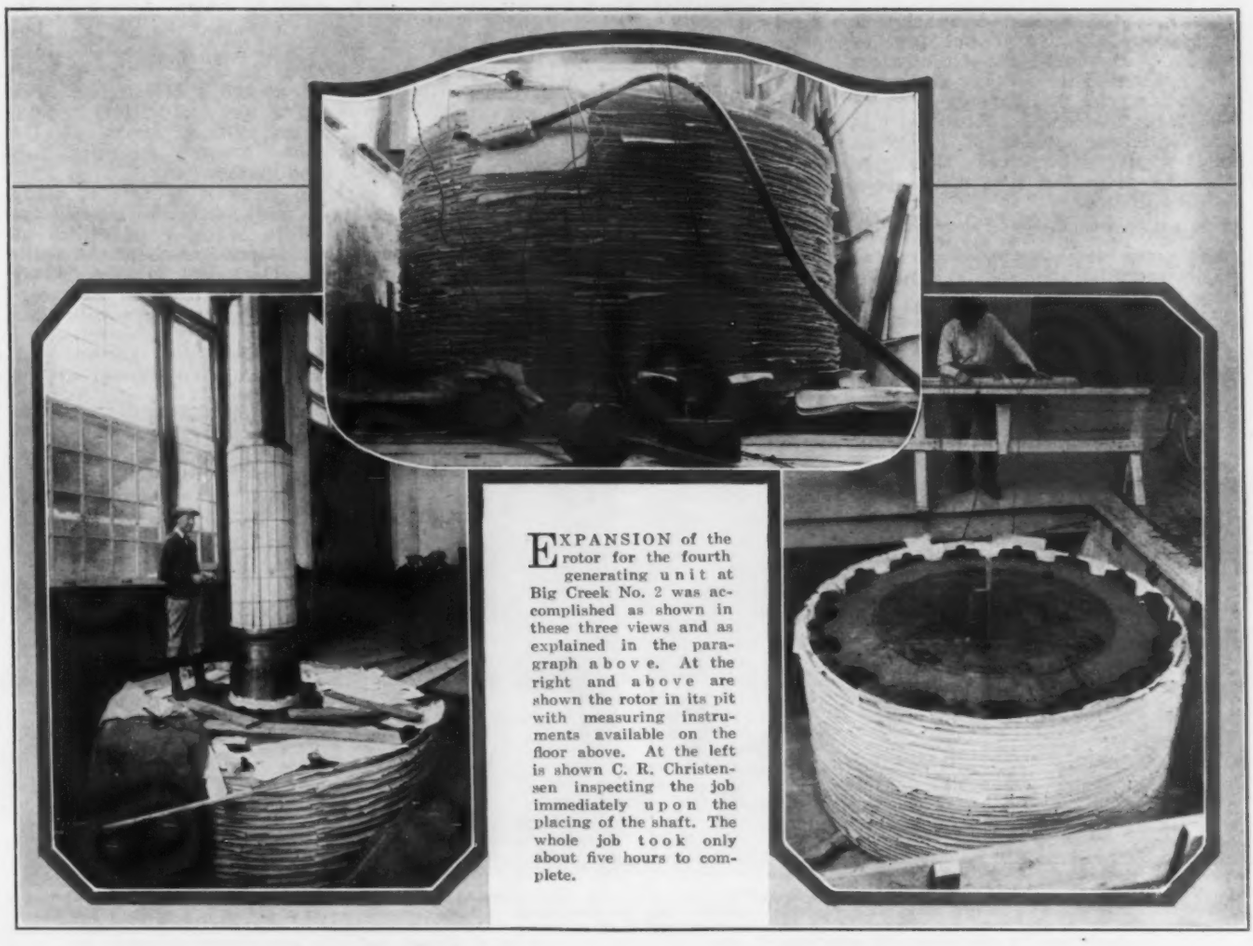
Cables of the span are attached to the towers with special U-type supports bolted through the pole to back plates. Figs. 3 and 4 show the construction details of the conductor and insulator arrangement at the pole tops. The double strings of insulators supporting the span conductors are Ohio Brass high-strength 10½-in. units while the other suspension units are Ohio Brass 10-in. units. The hardware also is Ohio Brass. The 7½-in. link strain insulators used in the guys are Western Electric.

Flow Alarm Made of Standard Pipe Fitting

An interesting automatic contactor switch used in certain localities by the Pacific Gas and Electric Company for sounding an alarm in the event of drop-off or complete failure of transformer cooling water is shown in the accompanying illustrations. The pipe fitting which has been adapted to this use is a standard Crane check valve. The arm extending to the right is attached mechanically to the shaft of the valve plate or paddle and acts somewhat as a counterweight as well as carrying the moving electrical contact. The flat piece of metal fastened to this arm serves as a signal flag and counterweight which tends to keep the valve closed against the out-flow of the water. One side of the circuit is the pipe itself and the moving arm, while the other side of the circuit is attached to the little mercury-filled cup. The cup is mounted upon a piece of insulating material directly under the contact point on the arm. The bearing should be kept well greased or oiled. It is not recommended that this device be used where the water is highly corrosive unless it be checked frequently and carefully.



A cooling-water flow alarm made up out of a Crane check valve and a little ingenuity. A schematic sketch showing the arrangement of the working parts of the flow-alarm mechanism described in the accompanying paragraph.



EXPANSION of the rotor for the fourth generating unit at Big Creek No. 2 was accomplished as shown in these three views and as explained in the paragraph above. At the right and above are shown the rotor in its pit with measuring instruments available on the floor above. At the left is shown C. R. Christensen inspecting the job immediately upon the placing of the shaft. The whole job took only about five hours to complete.

IDEAS FOR THE CONTRACTOR

Electrical Advertising—Its Forms and Design—III

Continuing the Discussion of Types of Signs, Including Enclosed-Lamp and Silhouette Signs and Posters

By C. A. ATHERTON, National Lamp Works of the General Electric Company.

The **proper lamp size** again depends upon the district brightness and the distance to which the sign must carry and may be determined from the following equation:

Lamp Size for Enclosed-Lamp Signs

$$\text{Lamp Watts} = \frac{10 \times \sqrt[3]{D'' \text{ (in feet)}}}{\sqrt{\text{D.B.F.}}}$$

In enclosed-lamp signs it is not safe to use lamps consuming more than 60 watts each. When, therefore, the distance and surrounding brightness are so great as to require more than 60-watt lamps on 6-in. centers—as found in the equation—the lamp spacing should be reduced rather than the lamp size increased.

Color in the enclosed-lamp sign is much more effective if put into or sprayed on the opal glass of the letters than if put into the glass of the lamps or even in dips or coatings or color hoods over the lamps. When color is used, a larger number of lamps or lamps of higher wattage* should be used, otherwise the sign will appear dull and lifeless.

3. Silhouette Signs

Silhouette signs are often called shadow-graph or shadow-box signs because the picture is seen as a shadow over an illuminated background.

It is the usual custom in the construction of silhouette signs to mount the letters on short metal pins. The letters should, of course, be far enough away from the background so that the light does not fall on their faces. When they are placed out as far as this, however, the pins are long and cast objectionable shadows.

A different effect, giving the sign individuality and at the same time eliminating the pin shadows, may be obtained by mounting the letters not on pins but on a heavy screen or a sheet of perforated metal which is suspended across the opening. If perforated sheet metal is used, it may be painted with any pleasing and non-interfering pattern desired which will show in the daytime but which will not show at night. A further variation may be introduced by using in place of the screen a very light translucent pattern or a sheet of glass on which the letters are mounted.

In this type of sign the greater brightness of the exposed-lamp sign is not obtainable; a greater emphasis should therefore be placed upon variety and artistic treatment.

For estimating the illumination of silhouette signs, it is necessary first to determine the size of the letters for a given area of effectiveness; second, to fix the location and the spacing of the lamps for uniform illumination; and third, to select the size of the lamps for the desirable degree of brightness. The size of the letters depends upon the greatest distance at which they must be effectively legible. This may be approximated as follows:

Letter Size for Silhouette Signs

$$\text{H (in feet)} = \frac{\text{D (in feet)}}{350}$$

in which H is the height of the letter measured on the center lines of the top and bottom strokes of the letter.

A smaller sign may often be used at some sacrifice to the advertising value but still within the limiting legibility distance which is obtained when

$$\text{H (in feet)} = \frac{\text{D (in feet)}}{700}$$

The lamps should be located in a line on 6-in. centers. For signs in which the strokes of the letters are 6 in. wide or more, a line of lamps should follow the outlines of the letter, located, of course, on the back of the letter and shielded from direct view of passers-by. For letters, the strokes of which are from 3 to 6 in. wide, the lamps should be located on the center lines of the back of the letter strokes and for small signs, in which the letters are too small to conceal the lamps, a line of lamps should be concealed in a trough along an upper border or preferably all around the lettering. For narrow signs, one foot or less in total width, a single line of lamps over the lettering and properly concealed, furnishes good illumination.

In large signs it is best to equip the lamps with porcelain-enameled angle reflectors in order to utilize as completely as possible all of the available light. The saving in energy made possible by using reflectors with correspondingly smaller lamps will more than offset the cost of the reflectors. If reflectors are not used, the inside of the pattern should be painted with a

* See note on page 459, Journal of Electricity, Dec. 15, 1925.

Fig. 13—An enclosed-lamp sign lends itself easily to a built-in part of the building. Architects can prevent many ugly edges to buildings they design by including in the plans provision for the electric signs and specifying the general artistic treatment.

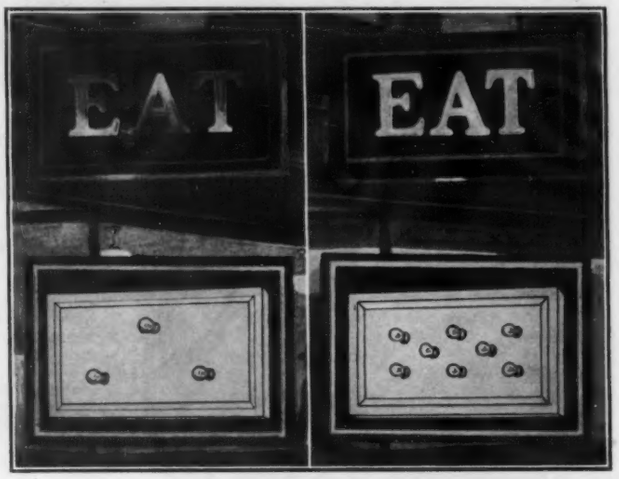


Fig. 14A—Spotty illumination of an enclosed-lamp sign. Fig. 14B—Properly spaced lamps—a lamp every six inches of the pattern surface. The number of lamps for smooth illumination of an enclosed-lamp sign equals the area of the illuminated surface in square inches divided by 40.

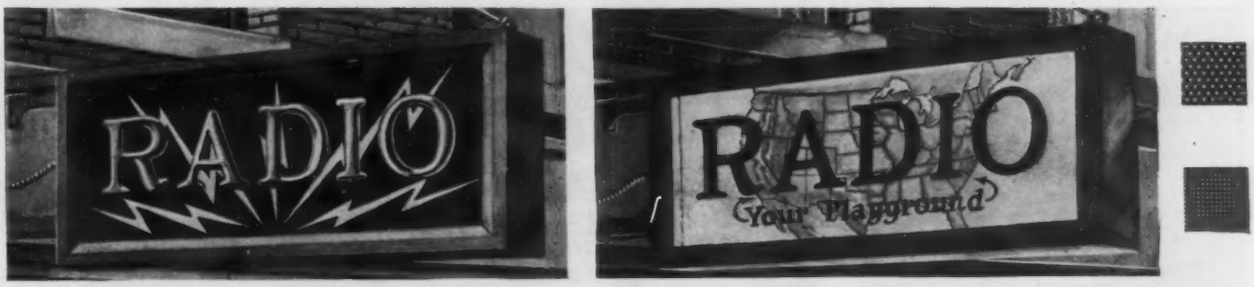


Fig. 15—Left: Day view of perforated metal silhouette sign. The background inside the box is invisible. Center: Night view of perforated metal silhouette sign. A new background and an additional message appears. Letters stand out dark against bright picture. Right: Perforated metal screen used for silhouette sign.

good white glossy paint or cellulose lacquer, and a reflecting plate built into the sign, as shown in Fig. 18.

The proper size of lamps is the same as that which should be used for an enclosed-lamp sign under the same general conditions and may be determined from the following equation:

$$\text{Lamp Watts}^* = \frac{3}{10 \times \sqrt{D.\ (\text{in feet})}} \Big/ \sqrt{D.\,B.\,F.}$$

4. Posters and Painted Outdoor Advertising

The requirements for the satisfactory illumination of poster panels, painted bulletins, or painted signs are:

a. The average amount of illumination should be correct for the given district;

b. Illumination should be smooth, without any bright or dark spots, and if there must be an illumination variation, it should be from a higher level at the top of the board to a lower level at the bottom;

c. Lighting units should be so constructed and mounted that no direct light is thrown into the eyes of the passersby;

d. Glaring reflections should be minimized as much as possible;

e. Lighting units and their bracket arms should either be decorative and pleasing or inconspicuous by day.

The illumination of a small percentage of poster panels and painted bulletins is effected with concealed projectors and this practice will grow with the increasing attention to artistic treatment. Because of the difficulty of finding a satisfactory place in which to conceal projectors, and the need for individual treatment of each case in order to insure smooth, uniform illumination, the lighting is usually accomplished with equipment attached to the structure.

The standard method of illumination for all surfaces which are not more than thirty feet high (and a frequent method for larger boards too) is by means of overhead porcelain-enameled angle reflectors. Very satisfactory illumination is obtained in this way. It is not possible, however, entirely to eliminate glare spots, although they may be reduced by the use of dull surfaces either in the paint or the paper. So far the units have not been made decorative enough to be really pleasing except at an increase in cost which has restricted their application to the more valuable spaces.

The principal lighting problems, when the overhead angle reflector method of illumination is adopted, are the determination of the proper location and the correct wattage of the lamps in the reflectors. The location of the lamps may be determined from the following table:

Table No. 3—Lamp Spacing (Feet)

Board Height	Distance Board to Lamp (P)	Distance Lamp to Lamp—Maximum* (S)
3	2	3
6	3½	5
8	4½	6½
10	5½	8
12	6	9
15	7	10½
20	9	13
30	12	18

The proper lamp size depends upon the district brightness and may be determined as follows:

First, determine the number of lighting units.

$$N = \frac{\text{Board Length}}{\text{Lamp-to-Lamp spacing}}$$

Then

$$\text{Lumens per lamp} = \frac{W \times H \times (80 - 5\,D.B.)}{N}$$

where W is the width of the board in feet, H the height in feet, and D.B. is the district brightness factor (See Table No. 1). This will give the desirable lumen output from each lamp.

* See note on page 459, Journal of Electricity, Dec. 15, 1925.

*This spacing distance may, of course, be made smaller in order to utilize the correct wattage, as determined from the district brightness on the board.

Fig. 16—Signs which are easily opened are more easily kept clean.

Fig. 17—The usual small silhouette sign consists of opaque letters mounted on pins in front of an illuminated background.

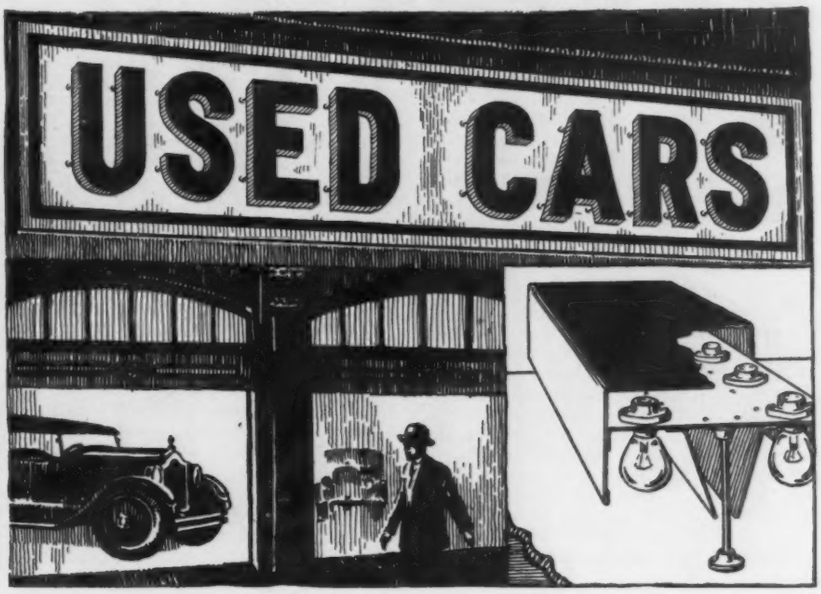


Fig. 18—Silhouette construction for large letters requires two lines of lamps following the outlines of the strokes of the letters. The effectiveness of this type of sign as well as its construction may be seen from the sketch.

Fig. 19—Silhouette construction for letters of a medium size requires a single line of lamps on the centers of the strokes.

Fig. 21—Distinction and beauty of design characterize this angle reflector without impairing its utility.

Select a lamp from the table below, the lumen output of which is nearest this value.

Table No. 4

Lamp Watts*	Approximate Lumens
50	500
75	900
100	1300
150	2200
200	3200
300	5000
500	9400

For large wall bulletins, floodlight projectors often offer the simplest installation as well as a pleasing one. The illumination from projectors should have the same general characteristics as that from angle reflectors except that the gradient in intensity from the top to the bottom of the board should not be so great, although even in this case the top of the board should be at least as brightly lighted and, if anything, more brightly lighted. The problems of selecting the right projectors and placing them, are identical for wall bulletins and for building displays. These are discussed in the next section.

* See note on page 459, Journal of Electricity, Dec. 15, 1925.

Spokane Dealer Puts in Line of Flowers.—An interesting experiment in the way of handling subsidiary lines is being tried by the Duncan Electric Company, Wall and Riverside Streets, Spokane, Wash. Charles Duncan, the owner, having some experience in flower culture, has included with his electrical contracting and merchandising business a line of cut flowers and plants. He hopes by this action to fill the valley in the volume of electrical merchandising business usually occurring after Christmas. If the two lines prove to be satisfactory store mates he will make the experiment permanent.

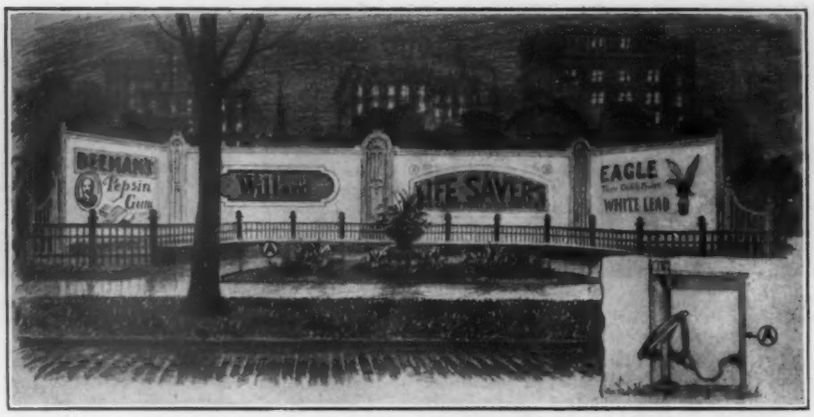


Fig. 20—By concealing floodlights in a trough and beautifying the area in front of poster panels and painted bulletins, the appearance can be made very attractive.

School for Apprentices Started in San Francisco

Industrial Association Is Operating a Training School Under Agreement with Electrical Contractors

Twenty boys have been enrolled in the apprenticeship school which is being conducted by the Industrial Association of San Francisco in line with an agreement with a number of the electrical contractors of the city. The class meets Monday and Wednesday nights from 7 to 9 p.m. and is instructed by Frederick Fisher of the Fisher Electric Company. After Feb. 1 it is planned to start an advanced class which will include all grades of helpers, with the exception of those having less than six months experience.

Under the agreement of the Industrial Association with the individual shops, each apprentice is to be started at the trade at a minimum of $2 per day when he begins work in the shop. He is placed on a one-month probation period, during which the employer will not discharge the apprentice until the case is reviewed by the apprenticeship committee. At the completion of this period he is classified as a bona fide apprentice.

Advancement (if the apprentice is in good standing as approved by the apprenticeship committee) will be made on the minimum schedule at rate of $.50 per day at the end of each six months of training, except after three years have expired at which time the apprentice is called a junior mechanic, if he qualifies by his practical work and the examination for that grade; and then he will be advanced at the rate of $1.50 per day at the completion of the last two periods of six months. This schedule is based upon $8 per day wage for all-around electricians and will be adjusted to any changes in the journeyman basis rate. An apprentice may be given advancement ahead of the schedule at the request of the employer when approved by the committee if the apprentice demonstrates exceptional ability.

All apprentices in training agree to attend school when called upon. Each must pass each course and examination for his grade before he is given advancement to the next grade. Each apprentice is registered, and his training card will be signed by his employer every six months. The employer agrees to give the apprentice the necessary experience to enable him to become an all-round mechanic. The Industrial Association will act as a court of appeal in all cases of complaints. The apprentice agrees not to quit his job until the case is heard by the Industrial Association; and the employer will not discharge an apprentice until the case is heard by the apprenticeship committee. In special cases the apprentice may be transferred from one employer to another.

A fair proportion of apprentices to journeymen will be maintained in the shops under the agreement (not less than one bona fide apprentice to three journeymen).

The schedule of training will be developed and approved by the apprenticeship committee in co-operation with the Industrial Association. The apprentices are selected by the Industrial Association and approved by the apprenticeship committee. The committee will make a periodic check-up on the progress of the apprentices and the operation of the apprenticeship agreement, which is signed by both apprentices and contractors with the apprenticeship committee.

The apprentice receives a bonus of $24 at the completion of each six months period of training in good standing if his attendance record shows better than 75 per cent and he passes the prescribed courses and examinations.

Class Instructed in Wiring Methods as Building Is Constructed.—Students in a class in electricity are receiving instruction in wiring methods as a manual training shop is being wired for the Dos Palos High School. J. E. Oust, Jr., proprietor of the Thor Electric Company, Merced, Calif., has the wiring contract on the building and he lectures to the class on various phases of the wiring as the building progresses. The regular instructor of the class and the students watch the work that is put in each day.

Ne Page McKenny Company, Seattle, Wash., has been awarded a contract for a street-lighting system in L.I.D. 4162.

Questions and Answers on the Code and Safety Orders

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of the Journal of Electricity such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

All who are interested are invited to send in their inquiries regarding the National Electrical Code to Claude W. Mitchell, Board of Fire Underwriters of the Pacific, Merchants Exchange Building, San Francisco, Calif., or to the Editor, Journal of Electricity, 883 Mission Street, San Francisco. Questions on the Safety Orders should be sent to George E. Kimball, Industrial Accident Commission, State Building, Civic Center, San Francisco, or to the Editor.

Q. Is it permissible to substitute BX for KNOB-AND-TUBE construction in frame bungalows in places where knob-and-tube construction is permissible for this class of work?

A. There is no provision in the National Electrical Code to prevent such substitution, but it is not allowed by some local inspection departments.

Q. What size neutral wire would be required in the service supplying four 660-watt two-wire circuits?

A. Some local inspection departments require a 3-wire service for four circuits. The minimum size of service wire required would be No. 10 for both neutral and other service wires for either a two or a three-wire service supplying four 660-watt 110-volt circuits.

Q. Is it permissible to bring the neutrals of branch circuits together into a common ground?

A. The grounded conductor of an interior wiring system shall have but one grounding connection within the building. Under ordinary conditions this ground shall be made at the service on the line side of the service switch. Neutral wires of branch circuits shall not be brought together, but each neutral wire shall be fastened under its proper terminal in the panel board. Some panel boards approved and arranged for single-pole fusing have these terminals mounted on a common strip or bus which is connected to the neutral feed or service wire and then grounded through the service ground.

Distribution Center an Important Feature in Large Buildings

Although completed some time ago, the electrical installation in the Pacific Mutual Building in Los Angeles has many features of interest to electrical engineers and contractors. The distribution center with its dead-front and dead-back switchboard is finished in marble and tile. This is shown in Fig. 1-A. Fig. 1-B shows it in the course of construction. Note the heavy angle-iron and channel-iron supports attached to rods under the ceiling to support the conduit.

The feeders for this building are shown in Fig. 1-C; the substantial construction of the supports for double-decking the conduit is particularly interesting. The tunnel shown in Fig. 1-D extends under the street from the Pacific Mutual Building to the Pacific Finance Building, and contains the feeders for the latter building. Due to the heat, these 500,000-circ. mil. cables are run in the open tunnel supported on porcelain cleats.

The electrical installation in this building as well as in the Pacific Finance Building was made by the Golden State Electric Company, Inc., of Los Angeles. This company specializes in electrical installations in large buildings of this type. Paul Ehm, president of the company, stated that the contracts on these two buildings had been awarded to it without competition.

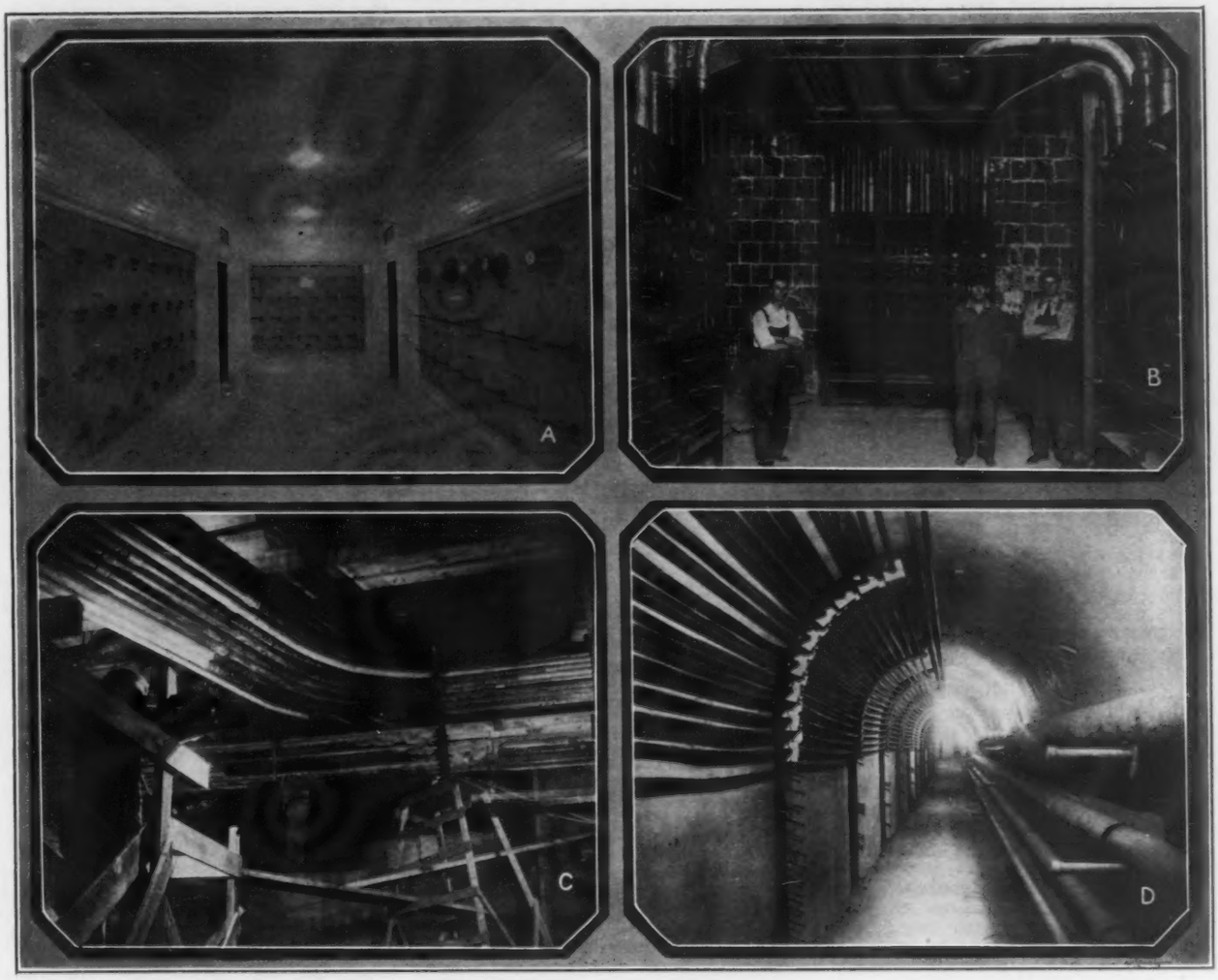


Fig 1. Distribution center and other electrical construction features in the Pacific Mutual Building in Los Angeles.

BETTER MERCHANDISING

In 1926 Make *Commercial Lighting* a Sales Builder

The Dealer, the Contractor, the Central Station, the Manufacturer, and Especially the CUSTOMER, all Profit from the Sale of Better Lighted Stores and Store Windows

Commercial Lighting Sold Like Kitchen Units

Central Station Puts on Program That Builds Load and Boosts Wiring for Contractor as Well

Wholly in the nature of an experiment, although it was realized clearly after a general survey of the business district that there was room for a great improvement in the commercial lighting, The Washington Water Power Company, Spokane, conducted its first campaign on commercial lighting units between Sept. 22 and Nov. 7, 1925. The survey showed that there were 3,100 stores and shops in the territory served, and, while only 30 per cent were properly lighted, it was estimated that about 7 per cent of the total should be sold three units apiece, or a total of approximately 650 units.

The Ivanhoe No. 5243 direct lighting unit with lamp, glass and holder was selected as the especial offering of the campaign, and orders were placed for two sizes, 9 in. and 16 in., arranged for installation with either chain or ceiling flange, at the customer's option. In the 16-in. size a few fancy units were ordered, but all others were plain.

For two weeks before the campaign the ten city salesmen were coached carefully on the theory and application of commercial lighting so as to enable them to proceed in the actual selling with full confidence in their own ability to solve all but the more complicated problems. A series of talks was given by W. R. Mathews, illuminating engineer of the power company, who could anticipate by his own previous work in this field the difficulties that the salesmen were apt to encounter. Of the ten salesmen, only two were acquainted with the commercial work; the experience of the other eight had been confined to house-to-house work in the sales of domestic appliances, an entirely different problem.

The booklet, "Building Store Profit with Light," issued by The Society for Electrical Development, was distributed among the salesmen.

Arrangements were made with six contractor-dealers to perform the work of installation, together with any additional wiring agreed upon. Prices were made for the several sizes and styles of fixtures, including installation where no changes in wiring were necessary. The salesmen were instructed to make this point very clear to prospective customers and, in cases where additional work on wiring was required, to obtain the customer's permission to have a contractor-dealer submit estimate of cost.

The general instructions given to the salesmen embodied the following points:

1926 Will Reward the Salesman

BY showing what others have accomplished in sales by explaining tried and proved methods of successful merchandising, by presenting original ideas from those who create sales ideas, by giving you concentrated, applicable sales information, the Journal of Electricity begins its 1926 New Year's Better Merchandising policy in this section. Here, on these pages, are told successful COMMERCIAL LIGHTING sales ideas and experiences. Likewise in each forthcoming issue will be found in this section concentrated, valuable suggestions on some one phase of electrical merchandising which you, as a dealer, may put into harness for your own good. The Journal invites your experience and advice to make this feature comprehensive and representative. And it counsels you to read well and utilize the best ideas of others as presented here in each issue. 1926 will richly reward the one who puts brains and energy into his sales effort.

1. Call upon customers during their slack periods.
2. Size up lighting equipment quickly but carefully.
3. Fill out data on survey card. (Fig. 1.)
4. If possible, make definite recommendation then and there as to size and number of new units.
5. Sell the idea of better lighting, overcoming objections based on cost of installation and operation by emphasizing advertising value and increase in sales due to good effects upon shoppers, and by showing what a very small proportion of the cost of doing business was represented by good lighting.
6. Give an estimate of total cost of installation, mentioning cash and term prices.
7. Get the order.
8. Fill out specification sheet. (Fig. 2.)

The salesmen were urged to make as many calls as possible in order to cover the ground in the allotted campaign period and to waste no time in places where the lighting was fairly good. They were impressed with the desirability of having a large number of small shops properly lighted.

A liberal program of newspaper advertising was executed, and during the first part of campaign two circular letters were mailed to the prospects, explaining the service that was being rendered by the power company and preparing the prospect for the call that would soon be made by one of the salesmen. Return postals were enclosed with these letters, listing six stores that had been equipped previously with proper lighting equipment and were considered good examples, calculated to arouse interest.

It was agreed with customers that fixtures would be removed and price refunded if after suitable trial they were regarded as unsatisfactory.

The results of the campaign were as follows:

Total calls made—about 1,900 or 60 per cent of prospects.

Total installations, 208.

Total units sold, 578.

Total kw. installed, 187.

Increase in annual revenue, $2,500.

The gross sales were approximately $6,800, and the expenses were practically the same in amount.

Of the 187 kw. installed, it is estimated that 90 kw. represent the increase. In many cases one new 300-

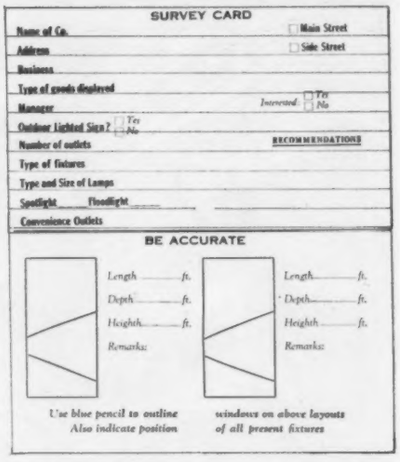


Fig. 1. Both sides of the survey card filled out by salesmen on the customer's premises, and upon which much valuable sales data were collected.

The Washington Water Power Co.

SPECIFICATION SHEET

Interior Lighting

Name ---------- Route ---------- Folio ----------

Address ----------

Kind of Store ----------

Ceiling Height ---------- Feet ---------- Inches

Color of Ceiling ---------- Of Walls ----------

Type of Ceiling
Plaster ----------
Metal ----------
Wood ----------
Concrete ----------

Type of Present Wiring:
Knobe and Tube ----------
Conduit or Metal Molding ----------
Wood Molding ---------- Width ---------- Inches

State whether wiring is concealed or exposed?

If additional wiring must be done, outlets moved or capped, state what is required and sketch location of new outlets on back of this sheet.

Actual cost of wiring $ ---------- Bid by ----------

Are Wall Switches installed? ----------

How many Units will require Pendant Switches? ----------

Is Fixture Stud installed? ----------

Do not Answer Questions below. To be filled out in Office.

Chain Suspension Hanger, Length in Inches ----------

Ceiling Flange, Size in Inches ----------

Glassware, Size ---------- Plain ---------- or Decorated ----------

Size of Lamp Recommended ---------- Number ---------- Watts ----------

Estimated Increased Wattage ---------- Revenue per Month $ ----------

Note remarks and unusual conditions and sketch store on reverse side.

Fig. 2. Specification sheet upon which orders for the commercial lighting units were entered. Where wiring was to be done this sheet was useful in presenting the data to a contractor for an estimate of the cost of the installation.

watt unit replaced three or four 50-watt lamps, of which possibly only one would be used most of the time, hence the use of the new 300-watt unit would create a very material increase in energy consumption.

For additional wiring over and above the actual installation of fixtures, $716.50 was expended by the customers among the contractor-dealers. This is not included in the cost of campaign as shown above, but amounts to about $1.25 per unit installed.

Although the campaign resulted in no merchandising profit, it is felt that it was a pronounced success. The attention of the local business men was attracted to the importance of proper illumination and to the fact that the power company has a distinct service to offer in that field. Since the campaign a large number of orders has been obtained, the initiative having been taken by the customers. The electrical contractor-dealers were enabled to perceive the possibilities of business in store and factory lighting, and several have been taking active steps to stir up new business.

The prices per unit were as follows, including installation, and either chain or ceiling flange.

16-in. unit—Plain	$12.00 cash,	$13.00 terms—	$4.00 down and $3.00 per month
16-in. unit—Fancy	14.00 cash,	15.00 terms—	4.00 down and 3.00 per month
9-in. unit—Plain	6.75 cash,	7.50 terms—	2.00 down and 1.50 per month

Pendant switch was included, if desired by customer, at an extra charge of $1.

If He's Perfectly Satisfied

Many merchants with really poor lighting in their establishments are quite satisfied that their lighting is wholly adequate. The reason is that they do not know of anything better in lighting. The fact that their stores may be less attractive, their windows less valuable because of poor illumination does not occur to them. They attribute poor business to "hard times," location, salespersons, to anything rather than lighting. With such merchants it is often impossible to sell improved lighting for the entire establishment all at once. But few merchants will refuse to make a test in one particular window, or one particular department, to try the idea out, especially if the installation can be handled co-operatively with him as to the cost of the demonstration. Once that demonstration is made, light will sell the rest of the job. Make a demonstration your entering wedge. It seldom fails if it is a good demonstration.

Where "Daylight" Windows Have Brought Results

The value of afternoon show-window lighting, both from the viewpoint of the merchant and that of the central station, was demonstrated effectively by the Utah Power & Light Company during the month of December.

The idea was brought to the attention of its commercial flat-rate window lighting customers in Salt Lake City by the power company by means of a letter inviting attention to the fact that the greatest number of shoppers are on the streets during the afternoon hours. Particularly during the holiday season, the letter stated, when windows are at their best and the skies are usually cloudy, illumination earlier in the day will add to the attractiveness of the display.

In order to provide this afternoon lighting service a schedule was arranged under which show window lights could be turned on at one o'clock p.m. instead of the regular hour at dusk. A card was enclosed showing the amount the customer was paying for flat-rate window lighting and the additional charge if afternoon service was desired for a 30-day period. The company's services also were offered in the handling of specific problems which the customer might have in regard to window lighting, such as color lighting and special decorative features. Approximately twenty-five per cent of the company's customers of this class in Salt Lake City adopted this service during the month of December, representing almost every kind of downtown merchandising business.

The company derived additional revenue of approximately $9.60 per customer for the month from this class of business.

Favorable comments were received from a number of these customers as to their opinion of the value of such lighting, and its use undoubtedly will be even more extensive and cover longer periods as a result of this satisfactory experience.

Show Red Man How Modern Home Is Vacuum Cleaned

When Indians gathered from all states of the Pacific Northwest to attend a general conclave at Spokane, Wash., held in conjunction with a civic Hallowe'en celebration there, the Eureka Vacuum Cleaner Company sales agency staged two exploitations contrasting the historic features of the Indians with modern living methods of 1925. Under the leadership of R. B. Carter, district manager, five motor trucks loaded with a carload of Eurekas to be sold in the Spokane territory in December were paraded and later posed before the picturesque tepees of the Blackfeet In-

KING EUREKA
"THE DADDY OF THEM ALL"
Gives Housewifes MORE HOURS of LEISURE
EUREKA Cleaning efficiency Is a fact not a Promise
$8.50 SET OF ATTACHMENTS FREE for a limited time ONLY

The Eureka Vacuum Cleaner Company's float in the memorable Hallowe'en parade at Spokane, in which the dusky squaw and her children were contrasted with the modern housewife who enjoys electric service in her home.

dians which were erected in the center parking strip of the downtown streets. In the Hallowe'en parade the Eureka float contained a squaw and two Indian youngsters standing near a giant cleaner built for exhibition purposes.

In December, 1924, the Eureka agency in Spokane sold 1,240 cleaners in its territory, and this load of 1,000 cleaners was a part of the December sales last year handled by The Washington Water Power Company in the Spokane territory and by other dealers in Mr. Carter's district.

Elaborate Lighting as Business Getter Is Tested

New Clothing Store, Spokane, Is Proving That Illumination Is Basis of All Retail Store Advertising

By W. R. MATHEWS, Illuminating Engineer, The Washington Water Power Company, Spokane.

Advertising itself as the "Best Lighted Store in the Northwest," the new Fogelquist Men's Store, Sprague Avenue and Howard Street, Spokane, recently has started out to prove that good illumination is the best kind of advertising for a store of this kind. This was the basis on which the illumination was sold to Mr. Fogelquist by The Washington Water Power Company, and the few weeks trial that the installation has had seems to indicate a thorough success for the undertaking. The installation, completed as it was at the commencement of the first comprehensive commercial lighting campaign this company ever attempted, is used by the lighting salesmen as a model of the practically ideal store-lighting job, and has been responsible for many sales of improved store lighting in the campaign now in progress.

The store occupies both floors of a new two-story building, 40 x 60 ft. The lower floor, occupied by the haberdashery department, is lighted by thirteen 300-watt lamps in chain-pendant safety hangers with bronze finish, and enclosed within Ivanhoe 16-in. Genco glass. These are spaced with regard to the counters, which extend around three sides of the room, and are suspended 10 ft. from the floor so as to give an approximately uniform intensity of 15 foot-candles on the merchandise. The second floor, housing the clothing department, is lighted by twelve 500-watt lamps enclosed within the same glassware suspended from ceiling flanges of the same design and finish as the pendant fixtures downstairs, and a like average intensity of 15 foot-candles is secured in this installation. In addition there is over each of the three mirrors a daylight unit Ivanhoe Trutint, consisting of a clear lamp with special lens and reflector to give accurate color determination.

Perhaps the most spectacular feature of the store illumination is that of the windows, in which an intensity of about 200 foot-candles can be secured. Forty-four 500-watt lamps are placed in X-Ray reflectors spaced on 18 to 22-in. centers, and these lamps and reflectors are hidden behind diffusing glass panes which form a ceiling to the window. This gives a wattage of 60 to 100 per sq. ft. of window floor area, and more than 250 watts per linear foot of glass. The windows are from 4 to 4½ ft. deep and are equipped with reversible backgrounds, one side of which is finished in a light gray tint, and the other in a dark mahogany. The light finish is used when dark goods predominate in the display, which, generally speaking, will prevail in fall and winter. With this background only one-half of the total wattage of the window lights is required. In the spring and summer when straw hats and light fabrics are on display the mahogany backgrounds will be used, and the full wattage will be necessary.

A feature of this window-lighting installation which makes it, on account of its load factor, a particularly desirable load from the standpoint of the power company, is that the lights are burned in the daytime to counteract the effect of the sunlight or ordinary daylight reflected by the window panes into the eyes of spectators. On bright days all the wattage is necessary to accomplish this purpose, while on dull, gray days only one-half is used. Again speaking generally, this means that here is a steady load of either one-half or full wattage used 14 or 15 hours a day the year round, with full wattage utilization occurring in the summer when normal curtailment of light reduces the lighting peak. In other words, a sufficient load of this character would tend to equalize the summer and winter lighting peaks on the system.

The second-floor windows also are utilized for display purposes, and at night are blocked off at a depth of 2½ ft. by drawing a gold cloth curtain. They are lighted by a combination of foot and overhead lights, the footlights being 150-watt lamps in Pittsburgh reflectors, spaced on 18-in. centers, while overhead are 15 X-Ray spotlights spaced to play on one piece of merchandise each.

The front also is illuminated spectacularly. Two groups, each of eight 500-watt floodlights, located across the street are so circuited on an ordinary sign flasher that each group flashes on and off alternately with no dark interval—one group equipped with clear lenses and the other with red. The alternate play of red and white light on the gold lettering of the store front produces an effect on the eye of the passerby irresistible in that it commands attention. Plans for additional outside lighting include the installation of a luminous glass-lettered sign to extend around the face of the window above the valances, and also an electric sign placed diagonally across the sidewalk on the corner, readable from all four directions.

The Fogelquist store is an old institution in Spokane that had not been particularly successful in its former location where it carried a grade of medium and low-priced merchandise. In moving to the new location the store changed its policy in this respect and now carries the best that can be procured. It is interesting to note that the window-lighting operating cost has been increased ten times, and the interior lighting twice, over the cost in the old location. The principal intention is to make the new store so fine in appearance that it cannot help but be noticed by everyone so that every shopper will know where Fogelquist's is and what it carries. Thus the store will be in a position to cash in on any kind of advertising campaign it attempts, which was not the case in its old location where advertising campaigns produced mediocre results at best. Thus, in the opinion of this merchant, illumination becomes the one essential basis of all retail store advertising.

EVEN property values were enhanced in the neighborhood when the Fogelquist Men's Store of Spokane opened, advertised as the "best lighted store in the Northwest." (1) Spectacular illumination of the store windows where an intensity of 200 foot-candles is secured. The lamps and reflectors are hidden behind glass diffusing panes making up the window ceiling. These windows are lighted during daytime to counteract reflections. (2) The main floor where a uniform intensity of 15 foot-candles is maintained. Here the merchandise displayed is shown off to best possible advantage. (3) The second floor clothing department is featured by the installation of a daylight unit over each of the mirrors.

NEWS OF THE INDUSTRY

Six States Only Needed for New Swing-Johnson Bill

Introduction of a new Swing-Johnson Bill, which would require ratification by six of the seven states of the basin to make it effective, the attempt to remove jurisdiction of the Colorado River from the Federal Power Commission, and California's efforts to bring about agreement on the allocation of waters from the river, marked the three Colorado River settlement attempts before the Senate and Congress at last reports.

Other material changes have been made in the new Swing-Johnson Bill. Half of the capital obligation must be repaid within five years, while four per cent interest is to be paid on the remainder, which is to be repaid, together with all operation and maintenance charges, within fifty years.

The provision for 20,000,000 acre-ft. of storage would mean a lower dam than that recommended in the report made to the Reclamation Service. The dam proposed in that report was to be 605 ft. high and provide 34,000,000 acre-ft. of storage.

The bill provides an authorization for $70,000,000, the same amount carried in the former measure.

Friends of the Water Power Act, on the other hand, are alarmed by the unanimous action of the Senate in suspending until Feb. 1, 1928, the "jurisdiction, power and authority of the Federal Power Commission to issue licenses for the purpose of constructing, operating and maintaining dams or reservoirs on the Colorado River and its tributaries." It is expected that similar legislation will be introduced suspending the operation of the Water Power Act on the Tennessee and on the Columbia.

The effect of such legislation, it is contended, is to suspend the public safeguards of the act and pave the way for the surrender of national rights or for gifts of public property.

In the case of the Colorado River, the public lands committee on one day reported favorably on a joint resolution, introduced by Senator Pittman of Nevada, and the next day passed the resolution by unanimous consent. Not an inquiry as to the effect of the action was made by any member when this far-reaching legislation came before the Senate. Senator Pittman urged the passage of the measure so that no state could obtain an advantage on the Colorado River pending the ratification of the Colorado River compact. He expressed the opinion that Arizona is encouraged to stay out of the compact which the six other states have ratified "by reason of the hope of obtaining through the Federal Power Commission the rights to build dams within the State of Arizona without regard to the effect it may have upon the rights of other states."

Since the Senate acted before any opportunity was afforded to hear from the commission it is expected that the real consideration of this matter will take place in the House of Representatives.

It is not improbable that an effort will be made in the house to amend the resolution so as to make it cover the Boulder Canyon dam as well. If this is done it is predicted the measure will lose the support of the public-ownership group.

Meanwhile California's efforts to bring about an agreement as to the disposition among the lower states of the Colorado River basin of the 7,500,000 acre-ft. of water which passes Lee's Ferry have revealed wide differences of opinion as to the allocation.

California, which contributes no water to the river and which has only a few square miles in the drainage basin, wants recognition of 2,146,000 acres of perfected rights and to a diversion of 1,095,000 acre-ft. for use by Los Angeles. California would allocate 300,000 acre-ft. to Nevada and 500,000 acre-ft. to Mexico. When all these amounts are added together a total of 4,273,000 acre-ft. is obtained. This would leave 3,227,000 acre-ft. of the total passing Lee's Ferry. This amount California would divide equally between herself and Arizona. This, added to the amount mentioned, would give Arizona 1,845,500 acre-ft. and California 4,854,500 acre-ft.

The Arizona committee figures differently. Under its plan California would receive but 3,350,000 acre-ft. Arizona agrees to the 300,000 acre-ft. for Nevada and the 500,000 acre-ft. for Mexico which, when deducted from the 7,500,000, leaves 6,700,000 acre-ft. This the committee proposes to divide equally between the two states, or 3,350,000 acre-ft. each. In addition, Arizona reserves for herself the waters of her own rivers which add 2,563,000 acre-ft. to the Colorado River total. A considerable part of this latter total cannot be utilized, due to the wide variation in the discharge of the Arizona rivers.

To Commence Work of Lighting Salt Lake Air Mail Field

Authority to commence work immediately on the lighting of the Salt Lake City air mail field, as a part of the lighting system now being installed on the Salt Lake to Rock Springs air route to enable night flying between these two points, has been granted officially by the general superintendent.

Included in the lighting plan of the Salt Lake field is one of the largest floodlights in the country—a 36-in. arc light of 200,000,000 candlepower, which will be used in giving the "daylight perspective" to the entire field. In addition to this, there will be a 24-in. incandescent beacon light of 5,000,000 candlepower and a number of boundary lights to mark the rim of the field and the byways. The plan also calls for red obstacle lights which will indicate all objects to be avoided by the pilots in landing.

Herminghaus Case Draws Protest from Irrigation Interests

Claiming that a decision either for or against the Southern California Edison Company in the appealed Herminghaus injunction suit against the former, preventing the power company from storing riparian water, irrigation interests said to represent 94 per cent of the irrigated lands of the state have filed briefs with the California supreme court asking the rejection of the injunction and demanding that the Edison company not be allowed to store riparian water but only such water as it can appropriate.

The case in question is one which was tried in the superior court of Fresno county. (See Journal of Electricity, March 1, 1925, p. 185.) It was brought against the Southern California Edison Company by the Herminghaus heirs, and a decision was handed down Feb. 13, 1925, in favor of the plaintiff. This decision enjoins the Edison company from storing water in Huntington Lake on its Big Creek hydroelectric project except that which is produced by the run-off in the Huntington Lake basin.

Hearing before the state supreme court on the Edison company's immediate filing of notice of appeal is set for Jan. 15, 1926, the state supreme court sitting en banc for the case in San Francisco.

To protect their interests the irrigationists filed briefs with the court contending that the Herminghaus-Edison case involves only 6 per cent of the state's lands, but that if either party wins in the supreme court approximately half of the remaining state's lands' right to water will be jeopardized or destroyed.

Joining in these briefs against both parties are the United States Reclamation Bureau, the Irrigation District Association of California, certain San Joaquin Valley irrigation districts interested in the Pine Flat project, the State of California, the department of public works of California, the state division of engineering and irrigation, the state division of water rights, W. F. McClure, director of public works, and Edward Hyatt, Jr., chief of the division of water rights.

Utah Company Buys Vernal Hydro Plant and System

The hydroelectric plant and distribution system of the Vernal Light Company at Vernal, Utah, has been purchased by the Utah Power & Light Company. The plant, which is located on Ashley Creek, serves in the neighborhood of 600 customers. The city council of Vernal has granted to the Utah Power & Light Company a fifty-year franchise.

A number of improvements and additions to the present plant and system are contemplated for the near future.

Western Electric Supply Separated and Incorporated as "Graybar"

With the distinction of being even one year older than the parent organization, the San Francisco branch of the renamed Graybar Electric Company, formerly known as the Supply Department of the Western Electric Company, holds the distinction of many pioneer achievements in the early history of electrical development, for which the Gray & Barton firm is itself noted in the East. The San Francisco branch was formerly the California Electrical Works; it was founded as far back as 1868 and reorganized in 1877. The Gray & Barton Company, later becoming the Western Electric Company, was founded in 1869.

These facts came to light with the historical data revived in connection with the separation of the electrical supply business carried on by the Western Electric Company from the telephone manufacturing business and its incorporation under the new, yet original, name of the firm, "Graybar," a contraction of the names, Gray and Barton, the founders of the Western Electric Company. This separation was announced late in December (see Journal of Electricity, Jan. 1, 1926, p. 32), the renaming becoming effective Jan. 1.

The San Francisco branch had the added distinction of participating in the installation of the first successful hotel electric annunciator, of the first multiple-call district telegraph box, of the first control station for light and power, and of the first electrical illumination for a theater. It was purchased, as the California Electrical Works, by the Western Electric Company in 1902 and became Pacific Coast headquarters. Later branches were opened in Oakland, Los Angeles, Seattle, Portland, Tacoma and Spokane.

The Western Electric Company lays claim to being the largest merchandiser of electrical supplies in the world, and the same claim is being made for the newly named organization as well. It has 55 distributing houses located in centers of business in various parts of the country.

The Western Electric Company has been both the manufacturing department of the Bell System and a merchandiser of electrical supplies. Since telephone manufacture and the distributing of electrical supplies are two distinct lines of business, each requiring specialized organization and specialized management, the physical separation of the two was decided upon and carried to completion in 1923. The rapid expansion of this department, and the importance of establishing for it an identity apart from telephone manufacturing, with which it is not involved, now has led to the incorporation of the business under the name, Graybar Electric Company.

The name of the new concern is derived from that of Gray and Barton, the partnership formed between Professor Elisha Gray and Enos M. Barton in 1869 for the purpose of manufacturing electrical equipment. The small shop of Gray & Barton, whose chief activity was the making of telegraph apparatus, fire alarm apparatus, and burglar alarms, developed into the Western Electric Company, manufacturer of most of the world's telephones. A $400 mortgage on his mother's house enabled Enos M. Barton to enter into this partnership. He had been a student of electricity and a telegraph operator.

Elisha Gray was a professor at Oberlin and an inventor whose devices became one of the firm's principal assets.

It is believed that this is the first instance in business history where a corporation after such a lapse of time and a period of such tremendous growth has reverted to its original designation as a basis for its corporate name.

The new company handles a wide variety of apparatus and supplies. Apparatus such as motors, generators, electric lamps, industrial and other lighting equipment, household appliances, and the like, formerly sold under the Western Electric name, now will be

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sold under the trade name "Graybar." The new company will be concerned with radio through its sale of broadcasting equipment and other radio telephone equipment which the Western Electric Company manufactures. Other supplies entering into the Graybar business are poles, pole line equipment, wire, cables, and accessories for electrical contractors and dealers.

The distributing organization with its fifty-five local branches represents the growth of many years and will not be affected by the change of name from Western Electric to Graybar. The purpose of these distributing houses has been to extend and improve the facilities available to buyers of electrical supplies. Edward J. Wallis is the Pacific Coast manager. William S. Berry is the manager of the San Francisco and Oakland houses, of which A. H. Nicoll is sales manager, L. J. Brown stores manager, and John Bray credit manager. Joseph Miserez is sales manager in direct charge of the Oakland branch.

At the other Pacific Coast offices of the Graybar Electric Company the same personnel will remain. H. L. Harper is manager of the Los Angeles branch. J. I. Caldwell is manager of the Seattle branch, and S. G. Ward manager of the Portland branch. J. P. Carson is sales manager for Graybar in Spokane, and V. E. McCain sales manager in Tacoma.

In the Intermountain territory A. C. Cornell is manager of Graybar Electric Company in Denver, with J. M. Perlewitz sales manager in Salt Lake City.

The board of directors of the parent Graybar company consists of Albert Lincoln Salt, president; Frank A. Ketcham, executive vice-president; George E. Cullinan, vice-president in charge of sales; Leo M. Dunn, vice-president in charge of merchandising and accounting, and the following executives of the Western Electric Company: chairman—Charles G. Du Bois, chairman of the board of directors and president; Richard H. Gregory, director and comptroller; Howard A. Halligan, director and vice-president; George C. Pratt, general attorney and secretary, and William P. Sidley, director, vice-president and general counsel.

Bank Sends Power Company Mail Stuffer to Eastern Clients

A new plan of distribution of advertising literature to attract industries to the site of low-cost power was developed at Spokane, Wash., where The Washington Water Power Company supplied a "stuffer" card to the Spokane & Eastern Trust Company of that city. This card will be included in all Eastern mail of the bank going to banking connections in other states.

The card is headed: "Low-Cost Power Invites Industry to Spokane." It cites the wide diversity of uses of electricity in the "Inland Empire" and contains an excellent photograph of the Long Lake power station of that company.

Power Line to Be Extended to Irrigation Experiment Station.—The Pacific Power & Light Company immediately will construct an extension of its service lines from Prosser, Wash., to the Irrigation Experiment Station, one and a half miles distant. The extension will give the station buildings current for both lighting and motor service.

Low-Cost Power Invites Industry to Spokane.
WATER FALLS drew the early settlers to the present site of the City of Spokane. These same falls, harnessed by this Electric Service company, supply an abundance of dependable electric light and power to the life and industry of this diversified district in the heart of the Pacific Northwest. Power is delivered by us at low cost to the mines of the noted Coeur d'Alene district in Idaho, the transcontinental railroad of the Chicago, Milwaukee & St. Paul system and to the factories, orchards, farms and homes of this district. This same power is an important factor to the lumber and clay products industries adjacent to this city
Seven hydro-electric stations, which have a total installed generating capacity of 187,300 horsepower, feed into a network of transmission and service lines in the sixteen counties of eastern Washington and northern Idaho which we serve. This Electric Service company stands ready at all times to serve the largest industry or the smallest home erected within its territory
Long Lake Dam and Power Station on the Spokane River
Four generators have an installed capacity of 94,000 h. p
THE WASHINGTON WATER POWER CO
THE SPOKANE & EASTERN TRUST CO. TAKES PLEASURE IN PRESENTING THIS CARD TO YOU FROM ONE OF ITS VALUED DEPOSITORS.

Mail stuffer provided by a power company for a bank to use in its mail to Eastern firms, advertising the low power cost in that community and inviting industries.

Personnel Changes Announced by Great Western Company

Changes in personnel recently announced by the Great Western Power Company of California include the appointment of H. E. Brillhart as manager of the Sacramento division, effective Jan. 1. Mr. Brillhart has been in the employ of the company for several years, and comes from Napa where he was in charge of the Northwestern division, which includes the Napa, Santa Rosa and Petaluma districts. J. W. Anderson, formerly district sales manager at Sacramento, succeeds Mr. Brillhart as manager of the Northwestern division with headquarters at Napa.

George B. Sanford, for many years in charge of the company's affairs at Sacramento, has been transferred to the right-of-way and claims department, reporting to the general office at San Francisco.

Marvin Curtis, Jr., formerly sales manager in the company's San Francisco division, has been made manager of the Rio Vista district, which takes in the territory from Clarksburg south to Antioch, Calif.

Stimulating Activity Among Coast Mazda Lamp Dealers

Working in co-operation with a number of supply jobbers handling National Mazda lamps on the Pacific Coast, members of the Pacific Lamp Division of the National Lamp Works of Oakland, Calif., together with a representative of the publicity department of the National Lamp Works of Cleveland, Ohio, recently made a tour of the principal cities on the Pacific Coast, in which they conducted twenty-one meetings and delivered a "Better Merchandising" story to approximately 1,800 lamp merchandisers.

Their program followed a dinner given by the jobber to his dealer agents, and consisted first of the showing of two reels of motion pictures. The first one presented pictures of Nela Park activities, including scenes of the Nela School of Lighting, lamp development laboratories, and lighting research departments; the second was a reel showing modern Mazda lamp-making. This was followed by a discussion of the new standard line of inside frosted Mazda lamps, of which the 25 and 100-watt sizes already have been made available to the trade.

The second part of the program was a talk on merchandising and advertising through the merchants' show windows, with a demonstration of show-window lighting. A complete portable show window was used for this purpose. Clark Baker covered this subject in a very complete and interesting way.

The third part of the program was a two-act playlet entitled, "Stepping It Up," depicting in a humorous, interesting, and instructive manner the high spots of electrical merchandising, especially as applying to lamps and lighting. The leading roles in this playlet were taken by G. R. Lawall, who took the part of the electrical dealer, and Clark Baker, who assumed the roll of jobber's salesman.

A. M. Sweeney, manager of the Pacific Division, National Lamp Works, was in charge of the tour. Those accompanying and assisting him in the program were G. R. Lawall, publicity department, National Lamp Works of Cleveland; Clark Baker and Douglas Ryan of the Oakland office of the Pacific Division, National Lamp Works; J. W. Cushman, Los Angeles branch manager; F. U. Bliss, Northwest branch manager.

Mountain States Light and Power Companies Form Merger

Consolidation of a number of electric light and power companies in Utah, Wyoming, Montana and South Dakota, under the newly formed Midwestern Power Company, was announced recently. Utah, Wyoming and Chicago capital is backing the enterprise, and it is stated that the company plans to extend its operations into other western states. The properties owned at present, or under contract for immediate purchase, serve Greybull, Worland, Riverton, Hudson and Yoder, Wyo.; Edgemont, S. D., and Baker and Forsyth, Mont., and adjacent sections.

Officials and directors of the company are: president—H. B. Waters, of Salt Lake; vice-president—E. P. Bacon, of Casper, Wyo., and formerly of Salt Lake; secretary and attorney, H. R. Waldo, of Salt Lake. H. C. Chappell, of Casper, E. B. Palmer, of the Palmer Bond & Mortgage Company of Salt Lake, and R. E. Wilsey, president of the R. E. Wilsey Company, a Chicago investment banking house, are among the directors.

Dealer meeting of the Electric Appliance Company, San Francisco, which was typical of the meetings given by various jobbers to their dealer agents in connection with the stimulating activity of the National Lamp Works of Oakland, Calif.

Puget Sound Company Negotiates for Steilacoom System

Negotiations are now under way between the city of Steilacoom, near Tacoma, Wash., and the Puget Sound Power & Light Company which, if consummated, will result in sale of the entire electric distribution system of the city to the power company. The Steilacoom city council has accepted tentatively the power company's offer for the distribution system, with the reservation that sanction to complete negotiations must be given by the voters of the city. Steilacoom voters will be called upon soon to express their views with regard to the proposed transfer.

The electric distribution system has been owned by the city of Steilacoom for a number of years. However, the council now feels that it is no longer desirable or economical for the city to continue to operate the system. The Puget Sound Power & Light Company, it is understood, has agreed to provide additional facilities and service to cope with growing demands of the community, should the deal be consummated.

Arizona Edison Company Buys Ice Plant at Florence

The Arizona Edison Company has purchased the ice and cold storage plant at Florence, Ariz., and is reported willing to take over the municipal light and power plant of that city. Current is obtained from the hydroelectric system of the Salt River Valley Water Users' Association, which also furnishes power for pumping large areas around Florence and Casa Grande. This electric service may be extended along the Southern Pacific lines from Casa Grande to Tucson where cheaper and better power is needed for agricultural needs.

The Arizona Edison Company already has bought the public utility plants at Bisbee, Douglas and Yuma.

Irrigation District Cannot Use Funds to Help Pass Bill

An opinion filed by Judge Walter Guerin of the Superior Court at El Centro, Calif., Dec. 26, stated that the payment of funds from the treasury of Imperial Irrigation District to promote passage of the Swing-Johnson bill is illegal. This decision was rendered in a test case brought by D. R. Crawford over the employment of Col. B. F. Fly of Yuma to go to Washington on behalf of the Boulder Canyon project.

An appeal probably will be taken, and it is expected that a number of municipalities will join in the fight to have Judge Guerin's decision overruled in the higher courts. Charles L. Childers, attorney for the Imperial Irrigation District, complained that if the higher court finally should approve Judge Guerin's decision, "no district or city could legally spend so much as the price of a postage stamp" to write to a congressman or a state legislator for the passage or defeat of a bill.

Company's Rate Base Valuation in Washington Reduced

Marking a step in the proceedings of the rate case of Walla Walla and other Washington cities against the Pacific Power & Light Company, Portland, the Washington Department of Public Works has issued a valuation order reducing the rate base valuation of that company's properties serving Walla Walla and the Yakima Valley by $1,137,244. This order is the outcome of the hearing held in Walla Walla, in August, 1925 (Journal of Electricity, Oct. 1, 1925, p. 264), at which evidence was presented tending to show that certain properties of the company were no longer used and useful in the operation of its Yakima-Walla Walla power system.

The largest item of reduction as listed in the recent order is an amount of $873,922, said to be the value of the Oregon properties included in the Washington rate base. This amount covers the value of the Walla Walla River hydroelectric plant with transmission lines and other appurtenances. The second item is an amount of of $204,519 by which, the order states, the value of the Fruitvale plant should be reduced in order to bring the value of that plant down to a reasonable amount per kw. of generating capacity. Other items making up the total reduction include the entire value of the Kennewick steam plant, $45,195, and of the Pomeroy steam plant, $13,608, these properties being listed as no longer used and useful. Notwithstanding these reductions, the order finds that the company earned in 1924 only 7.66 per cent net on the new base.

The company, it is understood, will bring suit in the Superior Court of the state to have the findings of the order reviewed. The company has contended throughout the proceedings that an entirely new appraisal should be made to establish beyond question the actual value, for rate making purposes, of the useful properties involved.

An interesting sidelight to the case is found in the introduction to the present legislature of the state of Washington of a bill appropriating $20,000 to reimburse the cities and towns of the district for expenses incurred by them in the preparation and presentation of evidence and in the prosecution of the case.

Action of House Foreshadows the Passage of Trunkey Bill

Passage of the Trunkey Bill, now before the state legislature of Washington in session at Olympia, is foreshadowed by the action of the house which, through a vote of 44 to 27, defeated an amendment offered by Mr. Jacobs of Pierce County that would have exempted the city light and power plants from the general provisions of the bill. Motions to table also were defeated.

The Trunkey Bill would compel the city of Seattle to hold new elections before issuing bonds for additional units of the Skagit power project. (Journal of Electricity, Jan. 1, p. 31.) The general provisions of the bill are that any utility bond issue for a municipally owned utility, in addition to all other requirements, must be submitted to vote of the people if the bonds are to provide for a new plant or a new unit.

Power Project Planned for West Slope of Cascade Range

Perfecting the company's titles to smaller operations started as far back as 1913, and opening the way for an expansion project that calls for two plants involving expenditures of $505,000, four water permits for the Sultan Electric Company, Sultan, Wash., on the west slope of the Cascade Range, were issued late in December by R. K. Tiffany, state supervisor of hydraulics. The applications have been under advisement since last July.

To be known as the Lake Isabel watershed, the larger of the two units will store 10,000 acre-ft. of water. Appropriation of 6 sec.-ft. of water from McCoy Creek and another stream leading from Tomtit and Roensiger Lakes also is authorized. The second reservoir, also located within a few miles of Sultan, will store 800 acre-ft. In conjunction with this reservoir is the authorization for the appropriation of 25 sec.-ft. of water from May Creek, a tributary of the Wallace River.

Purchasing and Stores P.C.E.A. Sets Meeting Date

The Purchasing and Stores Section of the Pacific Coast Electrical Association has set the date of its first meeting as Jan. 22-23, at the offices of the Los Angeles Gas and Electric Corporation, 810 South Flower Street, Los Angeles, Calif., according to a late announcement made by Frank W. Smith, Great Western Power Company, chairman of the section.

To Hold Division Managers' Meeting.—Allied Industries, Inc., San Francisco, will hold a meeting of its division managers in that city Jan. 18-21. The conference will be attended by division managers from Seattle, Portland, Los Angeles and Oakland.

Hurley Company Reorganizes and Changes Company Name

To be known as the Electric Household Utilities Corporation, and making changes in its authorized capital, as well as extensive changes in its personnel, the Hurley Machine Company, according to J. W. Ferry, manager, Pacific Coast division, intends to launch a business expansion program of considerable magnitude.

The change of officials of Hurley Machine Company, as authorized by the directors, included the election of S. D. Heed as president. Neil C. Hurley, who has been president of the company for twenty years, became chairman of the board, while Edward N. Hurley, previously chairman, became chairman of the executvie committee.

The members of the board of directors are, in addition to those serving on the executive committee, Joseph E. Otis, Silas H. Strawn, Alva J. Fisher, N. R. Birge and S. D. Heed.

A special meeting of the stockholders of the company was called to convene on Dec. 28 for the purpose of acting on the question of changing the name of the company from Hurley Machine Company to Electric Household Utilities Corporation, and of changing the authorized capital of the company from 300,000 shares of no par value to 600,000 shares of the par value of $10 each.

Grays Harbor Company Insures Employees.—Adoption of a plan of insuring all of its employees that has been under consideration for some time by the Grays Harbor Railway & Light Company, Aberdeen, Wash., was put into effect by that concern on Jan. 1. Under the agreement each of the company's 130 employees has been insured. Age does not affect the insured except that the cost to the company is higher in the case of older employees.

Northwest Electric Light & Power Association

Set Meeting Date for Northwest Technical Section

The third annual general meeting of the Technical Section of the Northwest Electric Light and Power Association is to be held March 11-12 at Seattle, the meeting place to be designated later by the committee on arrangements.

The meeting will take the same general form as the former general meetings of the section in which each committee is allotted a certain time for the presentation for discussion of subjects pertinent to its work.

Two papers of particular general interest scheduled at this time are a paper on the economies of safety work, as part of the program of the accident prevention committee, and a talk by a utility executive, as yet not definitely designated, on the desirability of public relations instruction among engineers and construction men. Invitations to address the meeting have been extended to C. F. Hirshfield, chairman of the Technical National Section, Col. William Kelly, director of engineering, N.E.L.A., and A. Jackson Marshall, secretary, National Electric Light Association. These men have signified their intentions of attending.

The meeting is to be open to all interested persons, whether members of the Technical Section or not.

First of a Series of Talks by Utility Executives Given

As a part of the program of the committee on co-operation with educational institutions, Public Relations Section, the first of a series of talks to be given by utility executives at Washington State College, Pullman, and University of Idaho, Moscow, was delivered Dec. 16, 1925, by L. A. McArthur, vice-president and general manager, Pacific Power & Light Company, Portland. Mr. McArthur's subject was, "Some Economic Aspects of Public Utilities," and he presented it to students in electrical engineering and business administration at both institutions.

This talk is to be followed by others on different phases of the utility business by other executives of Northwest companies.

Accomplishments of the Electric Transportation Association

Efforts which have been put forth by the Electric Transportation Association, San Francisco, in the development of electric transportation during the year just expired and the actual accomplishments along this line are contained in a report to the members by the retiring president, E. Kower of the Electric Storage Battery Company.

The association was largely instrumental in arranging for an electric truck school in San Francisco just prior to the N.E.L.A. convention in June. An electric truck luncheon was held at the San Francisco Electrical Development League on the opening day of the school. Immediately following this meeting a street parade of some eighty electric trucks passed the hotel in which the luncheon was held. An invitational luncheon for central station executives also was held during the N.E.L.A. convention.

The association conducted a co-operative advertising campaign during the year, in having an advertisement each month in three publications.

Legislative Work

Through the activities of the association a reduction in the state license fees on electric trucks has been obtained as follows:

½ and ¾-ton trucks	65 @ $20 each	$1,300
1-ton trucks	248 @ $15 each	3,720
2-ton trucks	134 @ $20 each	2,680
3½-ton trucks	23 @ $10 each	230
5-ton trucks	9 @ $10 each	90

Approximate annual saving to owners of 479 trucks, $8,020. The above tabulation excludes all electric trucks owned by public utilities which do not, under the California law, pay any license fees.

The association also has carried on a fight in the courts for declaring taxes previously levied against electric trucks as unconstitutional, and the organization has been advised by its attorneys that in all probability the decision of the appellate court will be in favor of the operators of electric trucks. If this decision is favorable it will mean a refund of licenses previously collected from owners of electric trucks aggregating in excess of $65,000.

Number of Trucks Sold

During the year the following electrics have been sold in the territory adjacent to the San Francisco Bay region:

	No. of Trucks	Average Monthly Rev. per Truck	Revenue to Power Cos. Monthly	Revenue to Power Cos. Annually
Street trucks	35	$15.00	$525	$6,300
Industrial trucks and tractors	29	12.50	250	3,000
Total	55		$775	$9,300

Puget Sound Company Properties Near Portland Are Sold

In a three-cornered deal involving approximately $1,700,000, the two utility companies of Portland each acquire new properties located near Portland formerly operated by the Puget Sound Power & Light Company, Seattle. The unit centering around Hillsboro, Ore., including tied-in distribution sbystems serving also Beaverton, Orenco, Cornelius, Dilley and Gaston, Ore., falls to the Portland Electric Power Company, which for some time has supplied power wholesale for serving this unit. The ownership of the water systems at Hillsboro and at Vancouver, Wash., also passes to this company. The Inland Power & Light Company, owning certain properties operated by the Pacific Power & Light Company and Northwestern Electric Company, acquire the unit serving Woodland and Kalama, Wash., and Rainier, Ore. This unit is to be operated by the Northwestern Electric Company, which now is serving territory adjacent to it in Clark County, Wash.

The units of the Puget Sound company thus disposed of comprise all the properties south of Kelso, Wash., formerly attached to the southern district of the company. It is understood that the headquarters of this district will be moved from Portland to Chehalis, Wash., where it will be more nearly in the center of the remaining properties operated from it. E. T. Steel, formerly manager of the southern district, has been transferred to Bremerton, Wash., to manage the new western district of the company. (Journal of Electricity, Jan. 1, p. 27.)

Jacobs Bill Passes Washington House Despite Protests

The Jacobs Power Bill, permitting cities to sell power outside their limits at a tax of 5 per cent, recently slipped through the House of the Washington Legislature now in session at Olympia, on a vote of 50 to 42, despite the opposition of the anti-municipal power group, led by Elmer E. Shields of Seattle. B. F. Jacobs of Puyallup, framer of the bill, opened the fight for the measure, explaining its provisions, and declaring that it contained the good features of both the Reed and Bone bills defeated at the last election.

The passage of the bill was one of the big surprises of the session, inasmuch as it seemed doomed for defeat from the time of its introduction. The bill struck a snag at the start in the committee on public utilities. Nine of the eleven members recommended that it be postponed indefinitely.

The city council of Seattle went on record against the bill, and in resolutions sent to each of the King County members opposed it because of the taxing feature. Nine of the seventeen King County representatives disregarded the Seattle council plea and voted for the bill.

The bill permits the sale of surplus electric energy by cities generating their own power, within fifty miles of the limits of such cities. A tax of 5 per cent on the gross sales of power sold outside the city limits must be paid to the state. (Journal of Electricity, Nov. 1, 1925, p. 346.)

Jacobs claimed that the bill does not permit cities to go into the general power business but that it brings in more taxes by providing for a 5 per cent tax on power sold outside. At the present time, he claims, the city of Tacoma is selling power to industries on its tide flats and to other places in close proximity, the sales amounting in 1924 to $111,999.25, and that if the bill had been in effect, it is pointed out, more than $5,000 in taxes would have been paid into the state treasury.

Telephone Company Places Order for Electric Trucks

The Southern California Telephone Company, Los Angeles, has placed an order for four 1-ton Walker electric trucks equipped with Exide Ironclad batteries. The telephone company also has been using a 3½-ton Auto-car electric truck equipped with an electric winch for cable-pulling and general heavy-duty city line work. The results of this test work have been highly satisfactory. It is believed this is the first company affiliated with the American Telephone & Telegraph Company to purchase electric trucks.

The American Railway Express Company, Oakland, Calif., has added three more 2-ton CT electric trucks to its Oakland fleet, which now contains eighteen units. The last holiday season was the heaviest one ever experienced in the East Bay territory, and the electric trucks have met every requirement of this exacting service.

Further Funds for the Minidoka Project Considered

A supplemental estimate for $1,385,000 to be used during the next fiscal year for the completion of the American Falls reservoir on the Minidoka reclamation project in Idaho is being considered by the appropriation committee of the House of Representatives. The contract provides for a dam with a reservoir capacity of 1,040,000 acre-ft., with alternate provision for the construction of a dam for a reservoir of 1,700,000-acre-ft. capacity. The construction of the reservoir is being financed on a co-operative basis with various canal companies and irrigation districts in the Snake River Valley in Idaho.

The storage water now contracted for and the amount required by the United States for the development of the Minidoka north side extension exceed 1,040,000 acre-ft. and, since the demands for water are increasing, the most economical construction to meet these demands is considered to be a reservoir with a capacity of 1,700,000 acre-ft. The increasing demands for additional water insure the return to the United States within a year or two of the moneys advanced for this construction.

Federal Power Commission Grants Permit for Elwha River Project.—A preliminary permit for a power project in the Elwha River, Clallam County, Wash.. has been granted by the Federal Power Commission to the Northwestern Power & Manufacturing Company, Port Angeles, for a period of two years. It is proposed to impound 15,000 acre-ft. of water, and construct a plant with capacity of 7,900 hp. The company propesed to build a concrete dam and adjacent power house developing a 160-ft. head in Glines Canyon.

News Briefs

New President to Head Electric Transportation Association.—E. C. Wood of the Pacific Gas and Electric Company, San Francisco, was elected president of the Electric Transportation Association at its regular December meeting, following the resignation of H. A. Fore, Philadelphia Storage Battery Company, due to his inability to attend regularly the meetings of the organization. At this meeting William Penfield, automotive engineer of the Associated Oil Company, gave a short talk on the subject of fleet operation. Mr. Wood followed this with a discussion on the work of the local chapter of the Society of Automotive Engineers.

Lift Water for Power Storage Reservoir in Japan.—A novel project, by which water is to be pumped from the Tadamigawa River to a lake a considerable height above the river bed, whence during winter drought periods it may be dropped back to the river bed through a power plant, is to be constructed by the Tokyo Electric Light Company, according to "Denkinotomo." The plant is designed to develop 8,000 kw.

New Light and Power Company Organized.—The Farmers Mutual Light & Power Company, Bellingham, Wash., has been organized for the purpose of supplying Birch Bay, a popular summer resort, with electric light and power service. James H. Milholin, Bellingham, heads the company.

To Increase Little Spokane River Plant.—Sale of bonds amounting to $60,000 has been announced by the Mt. Spokane Power Company, Deer Park, Wash., to secure funds for increasing its power plant on the Little Spokane River from 500 to 1,000 hp. and to extend service lines within its territory north of Spokane. About 1,000 customers were added in the past thirty months, about doubling the number of consumers of the company. The bonds sold represent a portion of the $100,000 in bonds authorized in 1922.

B. C. Electric Railway Company Builds New Substation.—Owing to the large amount of travel to the new buildings of the University of British Columbia at Point Grey, the British Columbia Electric Railway Company is building a new substation, at a cost of $87,000, at Dunbar Street and Twelfth Avenue, Vancouver. The substation, which it is expected will be put into operation by Christmas, will have three heavy feeders, joining the Fourth Avenue, Broadway, and West Point Grey lines. It will be automatic, practically noiseless, and the building will have the appearance of stucco residence.

Small Power Project Proposed for Crooked River, Ore.—Harry V. Gates, of Hillsboro, Ore., has applied for a license covering a project on Crooked River in Jefferson County, Ore. He proposes to construct a rock fill diversion dam 10 ft. high and 175 ft. long and 3,000 ft. of conduits to a power house where water will be pumped for irrigation purposes.

Street-Lighting Contracts Let in Pasadena.—Contract for the installation of an ornamental street-lighting system on East Colorado Street between Allen and Virginia Avenues, has been awarded to The Underground Construction Company, whose bid was $40,934. A similar contract covering installation of lights on North Fair Oaks Avenue between Chestnut and Washington Streets was awarded to the firm of Ducey & Breitenstein at a price of $44,000.

Another Montana Property Is Acquired by Tacoma Company.—The power and light property at Libby, Mont., consisting of steam and hydroelectric generating stations of about 400-kw. capacity and distribution lines serving Libby, has been acquired by H. M. Byllesby & Company. It probably will be operated by the organization of the Mountain States Power Company, Tacoma, a Byllesby company, according to C. M. Brewer, vice-president and general manager.

Utility Gets Option.—An option on the Craig (Colo.) Light & Power Company has been given by the Hendrie & Bolthoff Manufacturing & Supply Company of Denver to the General Light & Power Company of Chicago.

Washington Utility Plans New Building at Bellingham.—The Puget Sound Power & Light Company's branch at Bellingham, Wash., plans the construction of a fireproof storage and service building to house Skagit County offices and material for light and power department. H. B. Sewall is manager at Bellingham.

P.C.E.A. News

Secretary Requests Prompt Payment of Dues

Lack of promptness in the matter of dues payment for 1926 is causing embarrassment to the association, according to the statements of the secretary. Notwithstanding the fact that memberships date from Jan. 1 and the fact that bills covering dues have been sent to all members, Samuel H. Taylor, secretary of the association, states that remittances are not coming into his office in satisfactory quantities. Immediate attention to the matter is requested urgently by the secretary.

Lighting Committee Talk Given to Several Lunch Clubs

Carrying through its program of educational talks before the luncheon and commercial clubs of the state, the lighting committee of the Commercial Section, P.C.E.A., reported the special demonstration and talk recently launched before Electric Clubs (see Journal of Electricity, Jan. 1, 1926, p. 35), either given or scheduled to be given before a number of clubs.

D. C. Pence, Illinois Electric Company, assisted by T. L. Nudd, Allied Architects Association, both of Los Angeles, gave the talk to the Glendale Rotary Club, Dec. 17. G. H. P. Dellman, San Diego Consolidated Gas & Electric Company, gave the talk before the San Diego Rotary Club Jan. 7. W. L. Chawnor, The Southern Sierras Power Company, assisted by T. L. Nudd, gave the talk to the El Centro Rotary Club on Jan. 14. The Los Angeles Ad Club is scheduled to hear the talk early in March.

The San Francisco Electrical Development League heard the talk presented by Louis Leury, consulting engineer of San Francisco, on Jan. 4.

Detroit Meetings of Hydraulic Committee Reviewed

By Walter Dreyer, Chairman Hydraulic Power Committee, P.C.E.A.

The following outline covers the main points discussed by the national hydraulic power committee at the Detroit meetings early in October. As is known, last year's national committee was organized with standing subcommittees to treat with principal subjects, each to continue in existence until a final report may be issued covering the subject under study by the subcommittee.

The national committee agreed to publish in its annual report the entire work of the Pacific Coast committee. This makes it necessary to speed up the following subjects in the local program in order that they may be completed at the Technical Section conclave in San Francisco in January.

(a) Effect of speed regulation and water hammer on the design of relief valves, surge chambers and penstocks.

(b) Obstruction to flow due to vegetable growth in conduits.

(c) Evaporation losses in storage reservoirs.

Remaining subjects dealing with penstocks may be carried over to the March meeting as they will be included in the serial report on penstocks that is to be published later.

Reports covering the work of the sixteen subcommittees of last year are in various stages of completion. Some are ready for publication at the present time and the others are to follow. Hydroelectric Plant Layout, Fish Ladders, and Vibration of Water Wheels, were the subjects under study by Pacific Coast committees. Of these reports the first has been completed, the second is awaiting results of tests being made in the Northwest, and tests made to date in the field of the third subject are to be covered in time for publication in the annual report of the national committee.

A.I.E.E. News

Spokane Section will be addressed at its next meeting, Jan. 22, by J. L. Stannard, chief engineer of the Cushman power project of the city of Tacoma. Mr. Stannard is to give an illustrated talk on the Cushman project.

Cummings C. Chesney, manager and chief engineer, General Electric Company, Pittsfield, Mass., has received official nomination for the office of president of the Institute for the year 1926-27, according to announcement from Institute headquarters.

News of the Electragists

Southern Division California Electragists to Meet at Catalina, January 22-23

The California Electragists, Southern Division, will hold its quarterly meeting at the Hotel St. Catherine, Catalina Island, Calif., on Friday and Saturday, Jan. 22-23. The convention party will leave Los Angeles via the Pacific Electric Railway at 9 a.m. Friday, Jan. 22, and will arrive at Catalina Island at 12:15 p.m. in time for luncheon.

The merchandising section will meet in the afternoon. Five ten-minute speakers will talk on the following subjects: advertising, display of merchandise, purchase of merchandise, salesmanship, and one other subject which has not been announced. A major portion of the merchandising program will be devoted to the subject of refrigeration and some speaker of note will present the talk on this subject. The report of the merchandising committee will include the results of its activities in conjunction with the Edison company with regard to range sales, monthly sales of some special piece of merchandise, and flat installation charges for ranges, water heaters, and air heaters.

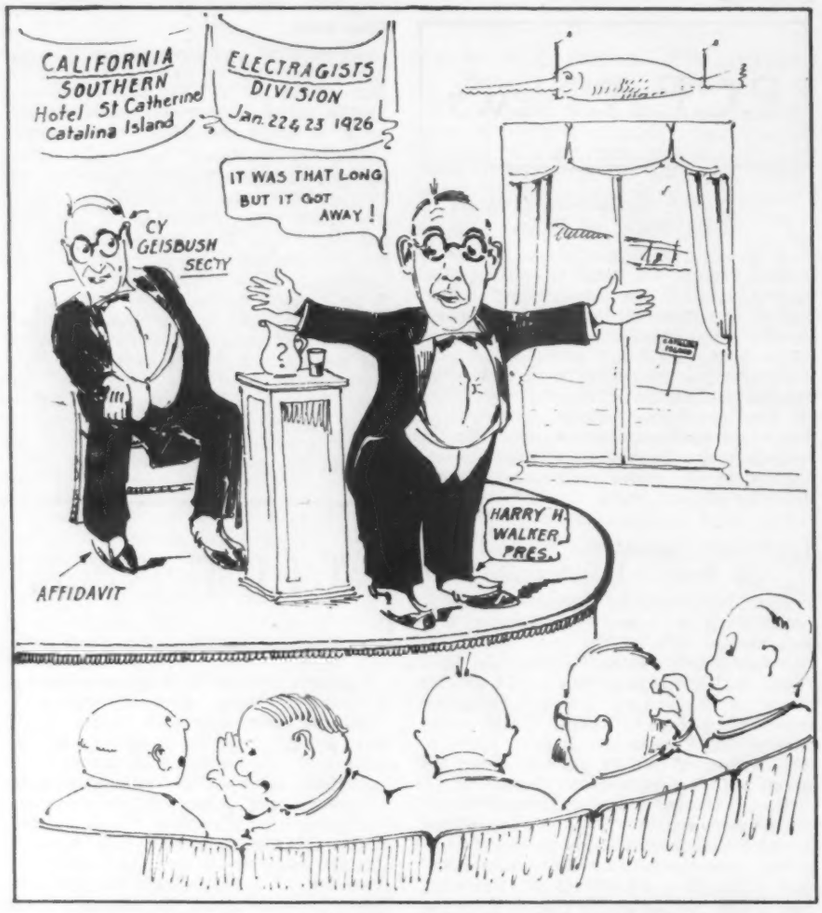
Immediately following the merchandising meeting a members' meeting will be held at which time the report of the executive committee will be presented. The meeting will be open to questions and discussion from the floor.

The banquet will be held in the main dining room of the Hotel St. Catherine Friday evening at 6:30, followed by dancing at the Casino.

The general open meeting will be held Saturday morning, when speakers will be heard on the industrial lighting campaign and the Red Seal plan. Two more speakers probably will appear on the program, one of whom will present the California jobbers' impression of the Milwaukee plan, and the other a subject to be chosen by the executive committee. Another members' meeting will be held following the general meeting if it is deemed advisable by the officers.

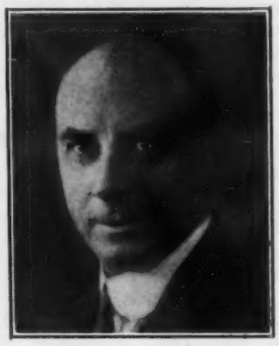
All during the convention unique entertainment will be provided for the ladies, including trips over the sky-line drive, in the glass bottom boat and to other points of interest. Arrangements have been made with the hotel for golf privileges for anyone desiring them.

The boat will return to Los Angeles at 3:30 p.m. Saturday afternoon, arriving at the Pacific Electric depot at 6:30 p.m. The cost of the convention, including transportation from Los Angeles to Catalina, hotel and four meals, and entertainment, will be $13.50 per person, special rates being made for children. Arrangements have been made with the hotel so that members of the party may remain until Sunday afternoon if they wish. The charge for this additional period will be $6 per person. Persons desiring reservations should communicate at once with California Electragists, Southern Division, 610 Cotton Exchange Building, Los Angeles.



The atmosphere may prompt the president to indulge in piscatorial reminiscences.

San Francisco Association Elects Officers for 1926.—The Electrical Contractors and Dealers' Association of San Francisco has elected the following officers to serve during the year 1926: president—Charles Shipman, Atlas Electric Company; vice-president—Sam Radelfinger, Radelfinger Brothers; executive committee members: Victor Lemoge and Edward Martin, Sterling Electrical Company.



Charles Shipman, who has been elected president of the San Francisco Association of Electrical Contractors and Dealers. Mr. Shipman has been connected with the electrical industry in San Francisco for nearly thirty years, beginning with his employment by the National Electric Company. In January, 1920, he became a partner in the Stimmel Electric Company, which later became Shipman-Lauer. In September, 1924, that concern purchased the Atlas Electric Company and has operated under that name since that time.

Branch of California Electragists, Southern Division, Formed at Long Beach.—At a recent meeting of electragists in Long Beach, a local branch of the California Electragists, Southern Division, was organized. The six charter members who attended this meeting were: Acme Electric Company, Baty Electric Company, Kuster-Wetzel Electric Company, Lane Electric Company, Mott Electric Company, and Newcomb Electric Company.

The Stewart Electric Company, Seattle, has purchased property at First Avenue South and Stacy Street to which the company will move as soon as certain alterations are completed. The firm now is located at 206 First Avenue South.

Two electrical contractor-dealer firms of Fort Collins, Colo., have been reorganized and combined under the name of **Stallings & Polley, Inc.** The incorporators are **C. A. Polley, E. E. Polley** and **William E. Stallings.**

Meetings

Fitting Observation of Yuletide by Seattle Electric Club

The Electric Club of Seattle on Dec. 21 in the club's Chamber of Commerce quarters entertained its membership with a Christmas tree and turkey drawing. Presents were distributed to each member by Tom Wood, vice-president of the club. The prize drawing for turkeys and boxes of oranges resulted in Tom Wood and George W. Cooley, of the George W. Cooley Electric Company, winning the national birds, and Charley Callahan of the A. G. Manufacturing Company, and George T. Thirsk, electrical engineer, the oranges.

A program of Christmas carols and a banquet preceded the prize drawing.

The club furnished the Christmas tree decorations for three trees donated by the Mountaineers Club to the Seattle Orthopedic Hospital. The lighting outfits, bought with Electric Club funds, were made up by the following club members: Jack Way, Tom Wood, D. U. Chamberlain, George T. Thirsk, Charley Campbell, George Campbell, Leonard Johnson, Harry J. Martin, Fred Block and Jim Stuart. Fifteen strings with an average of 16 lamps were made up.

Annual Christmas Party Held for Employees' Children

The annual Christmas party for children of employees of the Tacoma Railway & Power Company, was held Dec. 19. More than 1,000 were in attendance, of whom 600 were children. This year's party was devoted particularly to the children, each child receiving a present and a box of candy from Santa Claus. Those in charge were C. S. Reynolds, R. C. Saunders, George Levenhagen, W. M. Ringrose, L. L. Lamb and T. F. Marsh. Talks were made by R. T. Sullivan, manager, and G. W. Rounds, assistant manager.

Annual Stag Frolic of Salt Lake Electrical Men.—The male members of the electrical fraternity, and their friends, of Salt Lake City and adjacent territory, gathered at the Elks Club in Salt Lake City on the evening of Dec. 5 for their annual "Elektrik-Nite" frolic, sponsored by the Rocky Mountain Electrical Co-operative League. The affair was in the nature of a stag party, and was attended by more than 600 men of the industry. A program, consisting largely of athletic events, which included boxing and wrestling and musical numbers, was enjoyed thoroughly. Later refreshments were served.

Electrical Wholesalers Hold Open Meeting.—The annual meeting of the Electrical Wholesalers' Association was open to other members of the industry, and was held in the Italian room at the Whitcomb Hotel, San Francisco. Kenneth A. Millican, of the Pacific National Bank, was the speaker of the evening. His subject was "Three Points of Contact," and his address mentioned sales methods which might well be applied to the electrical industry.

Puget Sound Employees Have Big Christmas Celebration

On Tuesday evening, Dec. 22, the Puget Sound Power & Light Company, Seattle division, entertained 2,000 members of the Seattle organization, including wives and families, at a Christmas tree and carnival. The celebration, held at the Masonic Temple, is an annual affair. Cartloads of candy and all sorts of gifts were distributed by A. W. Leonard, president of the company, in the role of Santa Claus, assisted by Mrs. W. B. Donaldson, as Mrs. Santa Claus.

In Bellingham, headquarters of the northern division of the company, at Liberty Hall, James J. Ferrari acted as Santa Claus for the Bellingham employees and their families.

A Christmas tree and celebration similar to those held in Seattle and Bellingham also was held for Tacoma employees, wives and families.

COMING EVENTS

California Electragists, Southern Division—
Quarterly Meeting at Catalina, Calif.
Hotel St. Catherine, Jan. 22-23, 1926

Rocky Mountain Division, N.E.L.A.—
Section and Committee Conference
Idaho Springs, Colo.
Jan. 25-26, 1926

Western Association of Electrical Inspectors—
Chicago, Jan. 26-28, 1926

National Association of Railroad and Utilities Commissioners—
Kansas City, Baltimore Hotel
Feb. 9-12, 1926

Accounting Section, Northwest Electric Light and Power Association—
General Group Meeting, Portland, Ore.,
Feb. 1, 1926

American Institute of Electrical Engineers—
Midwinter Convention in New York
Feb. 8-12, 1926

Electrical Men of Colorado—
State-wide meeting under sponsorship of Electrical League of Colorado
Denver, March 26, 1926

Pacific Coast Electrical Association—
Annual Convention—Biltmore Hotel, Los Angeles
June 8-11, 1926

Women's Committee Stages Minstrel Show.—The Women's Committee of the electrical industry in Spokane staged a Women's Minstrel Show at the third annual Electric Ball given on Nov. 20 for employees of The Washington Water Power Company, the Spokane Central Heating Company and the Spokane United Railways. Maude McDonald, of the commercial department, The Washington Water Power Company, acted as interlocutor. About 600 attended the dance. The Women's Committee, acting as a local chapter of that committee of the Northwestern Electric Light and Power Association, has had an active program since its organization early in this fall. Mary K. Walsh of the department of public relations, The Washington Water Power Company, is chairman of the Spokane committee.

Colorado Electrical Men to Hold State-Wide Meeting.—A state-wide meeting of electrical men under the sponsorship of the Electrical League of Colorado is scheduled to be held in Denver March 26. After considering the matter at a number of sessions the advistory board adopted the recommendation of the special committee headed by L. M. Cargo.

Book Reviews

GUIDING PRINCIPLES OF PUBLIC SERVICE REGULATION

By HENRY C. SPURR, Editor of Public Utilities Reports, Vol. I, Rochester, N. Y., and Washington, D. C.: Public Utilities Reports Inc. Cloth; 6 x 9 in.; 752 pages; full index. $7.50.

Those who wish a digest of both commission and court rulings on the regulation of public utilities will find this a useful volume. After a brief review of the origin and growth of commissions and their powers, the author deals with the control of utilities in general, security issues, accounting, rates and various services. Limitations of commission regulation and distinctions between the powers of commissions and courts next are considered. There follow discussions of the various elements of rate-making and valuations for rate control. Compared with most of the books on utility regulation this one gives unusual attention to the rulings of the commissions, bearing in mind that many of these govern details of service which never or rarely come before the courts and for which, therefore, no precedent exists. A 50-page index and a table of cases also filling 50 pages provide easy reference to the mass of detail which the volume contains. For the benefit of those who have no time to go through the detailed reviews, most of the chapters conclude with a brief summary.

"Western States Gas & Electric Company," a booklet of ten pages, has been published by the Byllesby Engineering & Management Corporation. After stating that the Western States company serves 50,000 customers in 38 communities in eight counties of central and northern California, the book goes on to discuss its electric and gas plants, with particular attention to the El Dorado hydroelectric plant on the South Fork of the American River. Two pages are devoted to the diversified demands for service made upon the company, and the benefits of group operation are pointed out, the Western States company being operated under the direct supervision of the Byllesby Engineering & Management Corporation. The company, which has adopted the policy of customer-ownership, extends an invitation to the users of its service and other residents of the territories served to invest in its 7 per cent cumulative preferred stock. The booklet is illustrated with some very attractive photographs.

Purdue University Issues Bulletin on Watthour Meter Accuracy.—"Watthour Meter Accuracy as Affected by the Temperature Changes" is the subject of Bulletin No. 22 of the Engineering Experiment Station of Purdue University. Suitable text and 14 curves give some interesting information.

Personals

E. R. Northmore, superintendent electric distribution, Los Angeles Gas and Electric Corporation, Los Angeles, has been named general convention chairman for the 1926 convention of the

E. R. NORTHMORE

Pacific Coast Electrical Association. He has a long record for service in the electrical industry, for thirty-three years ago he entered the employ of the Los Angeles company as a lamp trimmer and consequently is an excellent object lesson in the art of "working up from the bottom." Since 1914 Mr. Northmore has been president of the Joint Pole Committee, a co-operative organization of twenty-one public utility systems which has saved to the consumers of southern California the cost of two hundred thousand poles. He has taken an active interest in the affairs of the electrical industry and is well known among its members, particularly in the West. Mr. Northmore is a member of the American Institute of Electrical Engineers and has served as chairman of the Los Angeles Section. He is also a member of the National Electric Light Association, in which he has served as chairman of the underground systems committee and in various other capacities.

J. L. Stannard, chief engineer of the Cushman power project of the city of Tacoma, recently was presented with a gold watch and chain by fellow employees as a token of appreciation for his services. **B. E. Torpen**, construction superintendent, made the presentation in the presence of the staff.

Harry A. Mulvaney, formerly with the Electric Sales Service Company, Berkeley, Calif., has accepted a position with the Majestic Electric Appliance Company, San Francisco, as designing engineer.

H. R. Austin, after twenty-five years of continuous service with the Los Angeles Gas and Electric Corporation, has resigned his position as assistant to the president, and retired to private life to take care of personal interests. On behalf of the corporation, A. B. Day, vice-president and general manager, presented Mr. Austin with a fine gold wrist watch.

Harry J. Martin, Seattle representative of the National Carbon Company, former president of the Electric Club of Seattle, recently spent some time in San Francisco.

Harry P. Cramer, assistant to superintendent, Portland Electric Power Company, Portland, attended a meeting of the National Nominating Committee, A.I.E.E., in New York, in December.

H. H. Schoolfield, chief engineer, Pacific Power & Light Company, Portland, was nominated for vice-president, Northwest district, A.I.E.E., at a meeting of the National Nominating Committee in New York in December.

E. O. Howard, president of Walker Brothers, bankers, of Salt Lake City, was re-elected president of the Utah Light & Traction Company, and chairman of the board of directors, at a special meeting of the board Dec. 15. **D. C. Green** and **O. J. Salisbury** were re-elected vice-president, **George B. Thomas**, secretary-treasurer, and **John F. Scheib**, assistant secretary-treasurer. The executive committee was re-elected as follows: **D. C. Green**, chairman; **E. O. Howard**, **David A. Smith**, **F. C. Schramm**, **J. M. Bidwell**.

Heckert L. Parker, formerly manager of the Pacific Radio Trade Association and more recently connected with the sales department of the Magnavox Company, has been appointed factory manager for the latter company with headquarters at Oakland, Calif.

W. W. Briggs, manager of the Grays Harbor Railway & Light Company of Aberdeen, has been appointed general chairman of the Grays Harbor county committee which is now delving into the financial phases of the proposed Olympic peninsula railway.

C. A. Harmony, district manager at Enumclaw, Wash., for the Puget Sound Power & Light Company for the last eight years, has been transferred to the Waterside division of that company as division superintendent. The Waterside division includes all of the district from the north city limits of Seattle to Everett. **E. A. Wills**, at present manager of the Kent, Wash., office, will be transferred to the Enumclaw district to succeed Mr. Harmony.

Arthur E. Rowe, of Garnett Young & Company, San Francisco, has been elected a director of the United Bank and Trust Company of California.

C. H. Knowles, an electrical engineer associated with John Graham, Seattle architect, is a new member of the Electric Club of Seattle.

Lorne A. Campbell, vice-president and managing director of the West Kootenay Power & Light Company, Rossland, B.C., has left for Australia. He will be away for several months.

J. C. Clark, until recently associated with the Pacific Electric Manufacturing Company, San Francisco, has joined the experimental staff of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, in the materials and process engineering department.

Arnold Pfau, Jr., formerly sales engineer of the American Resistor Corporation, manufacturers of Globar, has been appointed San Francisco representative of that company with headquarters in the Sharon Building. He is the son of Arnold Pfau, president of the American Resistor Corporation and consulting engineer in the hydraulic department of the Allis-Chalmers Company.

Clifford Cowling, for the past five years with the Northwestern Power & Manufacturing Company, Port Angeles, Wash., has been placed in charge of the Puget Sound Power & Light Company's transmission line maintenance between the north side of Hood's Canal and Port Angeles.

Arthur S. Dempsie, since 1919 with the Pacific Power & Light Company, Portland, first in the railway department at Astoria, Ore., and later in the investment department, has been appointed district manager at Seaside, Ore., taking the place of **E. W. Rouleau**, resigned.

E. D. Searing, advisory engineer, Portland Electric Power Company, Portland, has been appointed to the Oregon Technical Council as the representative of the A.I.E.E.

F. W. Davies, formerly with the Great Western Power Company, Sacramento, Calif., has been transferred to the San Francisco division of the company.

Leonard Clarke, Vancouver, Wash., manager for the Portland Electric Power Company, has been elected vice-president of the Vancouver Kiwanis Club.

Ray W. Turnbull, for the past eighteen months assistant Pacific Coast sales manager, Edison Electric Appliance Company, Inc., has been made Pacific Coast district manager, effective Jan. 1. P. H. Booth, who has been appointed a vice-president of the company, will maintain his headquarters in Los Angeles. Mr. Turnbull has been a member of the electrical fraternity for a number of years, having been initiated by the Southern California Edison Company in Pasadena, Calif. He left that organization to join the Pacific Electric Heating Company, Ontario, predecessor of the Edison Electric Appliance Company. As electric heating specialist, he became associated with the General Electric Company, San Francisco, in 1911, being transferred shortly thereafter to Portland, Ore., in the same capacity. After the war, in which he earned a commission in the aviation

RAY W. TURNBULL

corps, Mr. Turnbull entered the employ of the Edison Electric Appliance Company, with direct supervision over the Northwest territory. In 1924 he was appointed assistant Pacific Coast sales manager. As district manager, Mr. Turnbull's office will be in San Francisco, which will be Pacific Coast headquarters.

E. G. Frosty, formerly with the California Wholesale Electric Company, 413 East 11th Street, Los Angeles, has severed his connections with that firm.

A. C. McMicken, sales manager, Portland Electric Power Company, Portland, Ore., recently visited Salt Lake City.

George T. Thirsk, electrical engineer Seattle, was the official Santa Claus of the Electric Club of Seattle at a Christmas tree celebration and party sponsored by the club at the Orthopedic Hospital on Christmas morning.

Harris J. Ryan, professor of electrical engineering at Stanford University, Palo Alto, Calif., has been awarded the Edison Medal for the year 1925 "for his contributions to the science and the art of high-tension transmission of power." The greatest part of Professor Ryan's time at Stanford University has been devoted to research work in connection with high-voltage transmission. He is considered one of the foremost authorities on the subject of corona and has developed a high-voltage wattmeter for measuring corona and other power losses on high-voltage circuits. All experimental work to be carried on in the new 2,000,000-volt laboratory at the university will be in Professor Ryan's charge, and upon its completion his entire time will be devoted to research in connection with that equipment. Professor Ryan received the degree of M.E. in electrical engineering from Cornell University in 1887, and in 1888 entered the employ of the Western Engineering Company at Lincoln, Neb. A year later he was made instructor in charge of the electrical machinery laboratory at Cornell; from 1890 to 1895 he served as assistant professor of electrical engineering in provisional charge of the department. Then he became professor in charge of the department of electrical engineering, leaving there in 1905 to accept the position at Stanford University that he still holds. Professor Ryan has served as director, vice-president and president of the A.I.E.E., and is a member of a number of other engineering and scientific societies. He also has been active in an advisory and

HARRIS J. RYAN

consulting capacity, having acted as consulting engineer for the Los Angeles aqueduct, as a member of the Pacific Coast section of the Submarine Group, National Research Council, during the war, and having been in charge for the Research Council of the Supersonics Laboratory at Pasadena in 1918 and 1919.

Fred W. Carlson, Seattle representative of the Crouse-Hinds Company, recently returned to Seattle following a several weeks' business trip through Eastern centers. While away he attended the meeting of the American Electric Railway Association at Chicago and also spent some time in Syracuse going over some new engineering development. He returned via San Francisco.

E. N. Brown, president and general manager, Majestic Electric Appliance Company, San Francisco, is in the East on an extended business trip, visiting Philadelphia, New York and other points.

H. W. Bertholas, formerly foreman of the Pacific Gas and Electric Company's Pit No. 3 plant, has been made superintendent of Pit No. 1, Pit No. 3, Hat Creek No. 1 and Hat Creek No. 2 power houses, following the resignation of **M. P. Werry.** Mr. Bertholas' headquarters will be at Fall River Mills, Calif. **W. E. Dunwoody** succeeds as foreman at Pit No. 3. **Charles E. Smith** is foreman at Pit No. 1, and **Ed Stone** is foreman at the two Hat Creek power houses.

Leonard A. Hobbs, Pacific Coast district manager for The Edwin F. Guth Company, St. Louis, has announced that, effective Dec. 15, Oregon, Washington and British Columbia have been added to the territory under his jurisdiction. Mr. Hobbs will make his headquarters in San Francisco.

B. M. Atkins, manager of the Kelso-Longview, Wash., division of the Puget Sound Power & Light Company, was a recent speaker at a luncheon meeting of the Kelso Merchants Association. He told of the growth and development of the Puget Sound Power & Light Company in Kelso and nearby cities.

C. A. Lund of the city light department, Tacoma, Wash., a past president of the American Institute of Electrical Engineers, has been elected president of the Tacoma Engineers' Club for 1926. **E. E. Foote** of the Consumers' Central Heating Company and **C. A. Miller** of the Puget Sound Power & Light Company, were chosen vice-presidents. **William J. Welsh,** of the Puget Sound Power & Light Company, has been named secretary. These officers, with **William Roberts,** consulting engineer; **Glen Parker,** U. S. Geological Survey, and **K. A. Kunig** of the city of Tacoma water department, constitute the board of directors.

H. L. Sampson, formerly substation engineer in the operating department of the Southern California Edison Company, Los Angeles, has been appointed superintendent of wholesale power for that company. In his new capacity he will retain a large percentage of his previous duties and in addition will assume responsibility for all arrangements in connection with service to the wholesale power consumers of the company.

E. T. Steel, formerly manager of the southern district, Puget Sound Power & Light Company, has been named manager of the newly formed western district with headquarters at Bremerton. **C. F. Kirchhaine** has been appointed acting assistant treasurer; **F. H. Kerr,** sales manager; **E. R. Night,** superintendent of light and power; **W. F. Sachtleben,** resident manager at Bremerton; **J. L. Keeler,** resident manager at Sequim; and **J. M. Kinkaid,** resident manager at Port Townsend.

Stanley V. Walton, who started his business career in the electrical industry, has returned to that field with his acceptance of the managership of the home department of the Oakland division of the Great Western Power Company of California. He succeeds O. R. Doerr, who has become manager of the heater division of the Magnavox Company, Oakland. After graduating from the University of California in 1904 with the degree of electrical engineer, Mr. Walton entered the employ

STANLEY V. WALTON

of the Pacific Gas and Electric Company in 1905. Three years later he was made manager of the commercial department, remaining in that position until Dec. 31, 1917, when he resigned to take up fruit ranching in Sutter County. After four years of life on the farm he returned to commercial life as sales manager for Bonestell & Company, San Francisco, leaving there in the latter part of 1924 to become associated with Blair & Company, with whom he has been connected for the past year. Members of the electrical fraternity will be glad to welcome Mr. Walton back to the fold.

Harry H. Daley, formerly with the Majestic Electric Development Company, and more recently with the Magnavox Company of Oakland, has accepted a position with the Majestic Electric Appliance Company, San Francisco, as sales manager.

Obituary

George Newman, president, Vallejo Electric Light & Power Company, Vallejo, Calif., died in San Francisco, Jan. 4, following an illness of five days.

Romulus Riggs Colgate, a pioneer in the development of electric power in California, died Jan. 6, in Sharon, Conn. He was instrumental in the consolidation of the Nevada Power Company and the Yuba Electric Company into the Bay County Power Company in 1892 and later in the establishment of the California Gas and Electric Company, the predecessor of the Pacific Gas and Electric Company. The latter company's Colgate power house was named in his honor.

TRADE NOTES

Automatic Electric Washer Company, Newton, Iowa, has completed a new model No. 76 copper tub electric washer with a number of improved features, among them being the new wringer; the Duco finished and electric spot-welded steel base; the hydro-disc washing principle that washes by water action and drives from the top and not through the tub bottom; the self-draining corrugated copper tub; the double aluminum top; the worm gear drive; the standard appliance plug on attachment cord, and many other advantageous features.

Malleable Iron Range Company, Beaver Dam, Wis., has appointed L. J. O'Brien, formerly with the Great Western Power Company of California, San Francisco, to handle the Monarch electric range, manufactured by the Malleable Iron Range Company. He will represent the company for this product in California, Nevada and western Arizona.

Allis-Chalmers Manufacturing Company, Milwaukee, has issued bulletin No. 2082, which is fully descriptive of its centrifugal boiler feed pumps. Bulletin No. 1823, issued recently, describes crushing rolls, from their mining machinery department, while Bulletin No. 1228 illustrates and describes the Allis texrope drive, manufactured in the transmission department.

The Ludlum Steel Company, Watervliet, N. Y., is making many additions to its plant. The capacity of the billet grinding department has been doubled, the new addition being completed and ready for occupancy early in January. The new department is equipped with a most modern exhaust system for the elimination of the dust incidental to all grinding operations.

Rome Wire Company, Rome, N. Y., is publishing a series of bulletins dealing individually with every type of wire. The first two cover magnet wire and super service cord. The third deals with bare wire and contains useful data and tables regarding construction, sizes, weights, current carrying capacities and other items.

The Allen-Bradley Company, Milwaukee, manufacturer of electrical controlling apparatus, has published recently a bulletin on its graphite disc rheostat for general industrial applications. Copies of the bulletin will be furnished to anyone interested in this product.

Simplex Wire & Cable Company, Boston, has opened a branch office in the Lew Building, St. Augustine, in order better to care for the steadily increasing volume of business in Florida. F. H. Pettee will be manager of the new office.

Chicago Fuse Manufacturing Company, Chicago, has appointed F. L. Williamson as eastern sales manager, with headquarters at 71 Murray Street, New York.

trode holders and other accessories.

Automatic & Electric Furnaces, Ltd., London, has issued an interesting catalog on the Wild-Barfield electro-magnetic furnace for the automatic hardening of steel.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, has placed on the market a new electric range known as the Senior Cabinet. One of the noteworthy features is an exceptionally large oven 18 in. high, 15 in. wide and 17¼ in. deep with a lining of vitreous enamel. The range is furnished with Westinghouse automatic control for the oven operation and has reciprocating switches and a 1,000-watt appliance receptacle. It occupies a space 54 in. high, 24½ in. deep and 46¾ in. long. It is manufactured in either black japan or grey enamel finish.

Western Electric Company, New York City, has just issued its 1926 Fan Manual featuring its corps of "silent salesmen," namely, window displays, folders or envelope inserts, newspaper advertisements ready for dealer's name and address, cuts for dealers who may wish to write their own advertisements, and window posters. The booklet is compiled attractively, with actual copies of two of the folders, and artistic reproductions of the window displays, advertisements, cuts and posters.

Condit Electrical Manufacturing Company, South Boston, has issued catalog No. 1006-2, covering switchboards manufactured by the company. The pamphlet is illustrated with drawings and photographs and is fully descriptive of the various types of switchboards developed by the company.

The National Carbon Company, Seattle, has moved its offices from 1301 to 1501 L. C. Smith Building. Harry J. Martin is the district representative.

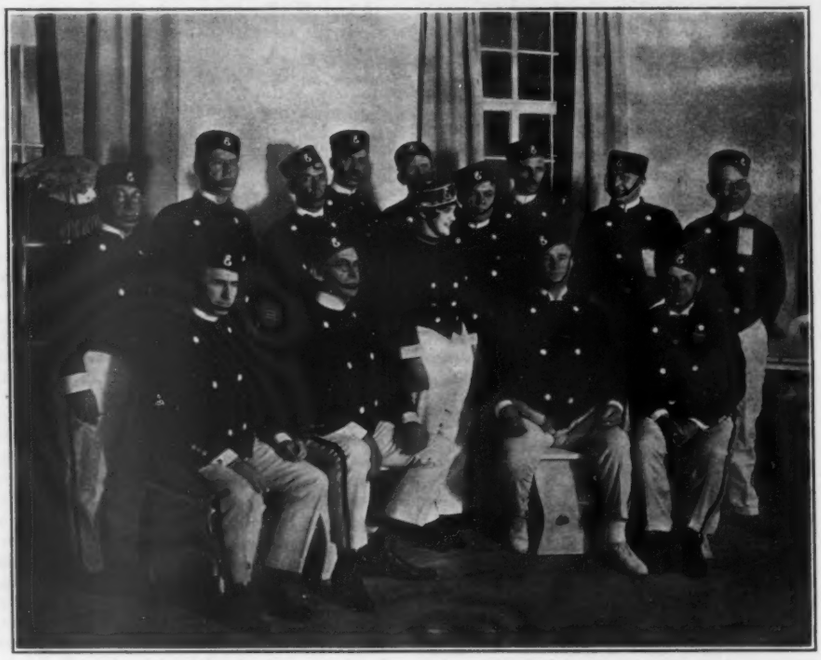
General Electric Company, Schenectady, has issued recently a 160-page catalog for 1925 and 1926 covering industrial control. The book contains much information, with a complete index of subjects covered. Price lists are given with ordering directions. Another interesting publication recently produced is bulletin No. GEA-123, covering automatic voltage regulators for alternating-current generators. An attractive 44-page booklet containing photographs and covering the electrification of the Chicago, Milwaukee & St. Paul Railway, is a recent publication also produced by the General Electric Company.

H. B. Sherman Manufacturing Company, Battle Creek, Mich., recently has made extensive expansions in its plant, including larger brass foundry and finishing shop where it is producing cast brass goods such as hose fittings, compression work and pipe fittings. Improvements also have been made in the stamping departments for the production of electrical lines and sheet brass hose fittings.

Ward Leonard Electric Company, Mt. Vernon, N. Y., has issued recently bulletin 69 on Vitrohm battery-charging equipment that contains a complete price list. Through a typographical error announcement of this bulletin appeared in the Dec. 15 issue under the name of Ward Electric Company.

Chicago Fuse Manufacturing Company, Chicago, has developed a new type of "Union" outlet box designed especially for use with armored cable in lath and plaster construction. It also is adapted for loom and is made in three styles.

The Magnavox Company, Oakland, Calif., has started an advertising campaign in the California newspapers featuring its new Magnaray electric heaters.



"Busy Buttons" as collectively portrayed by a group of Southern California Edison Company officials at the annual Christmas party held Dec. 18. It is apparent that they are all taking their new duties much to heart. Those in the group are: seated, left to right—F. B. Lewis, R. H. Ballard, B. F. Pearson, H. W. Dennis. Standing—Will Fisher, W. L. Frost, A. R. Kelley, D. M. Trott, R. E. Smith, S. C. Haver, Jr., C. P. Staal, F. L. Greenhouse and E.R. Davis. Miss Helen Hineman is in the center of the group.